FOUNDRY TRADE JOURNAL

EST. 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

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SEPTEMBER 1, 1960

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Offices: John Adam House, John Adam St., London, W.C.2

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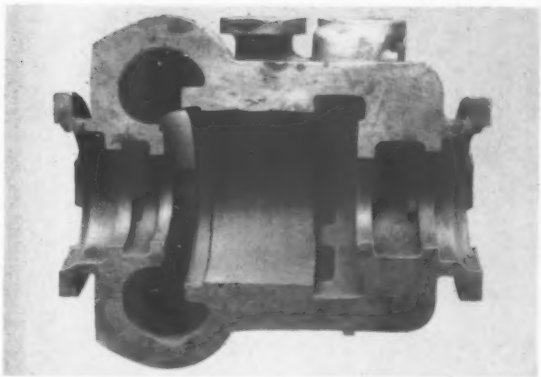

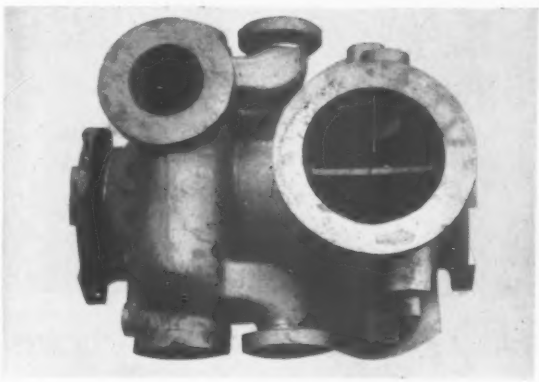

For full technical information send for Leaflet No. 15

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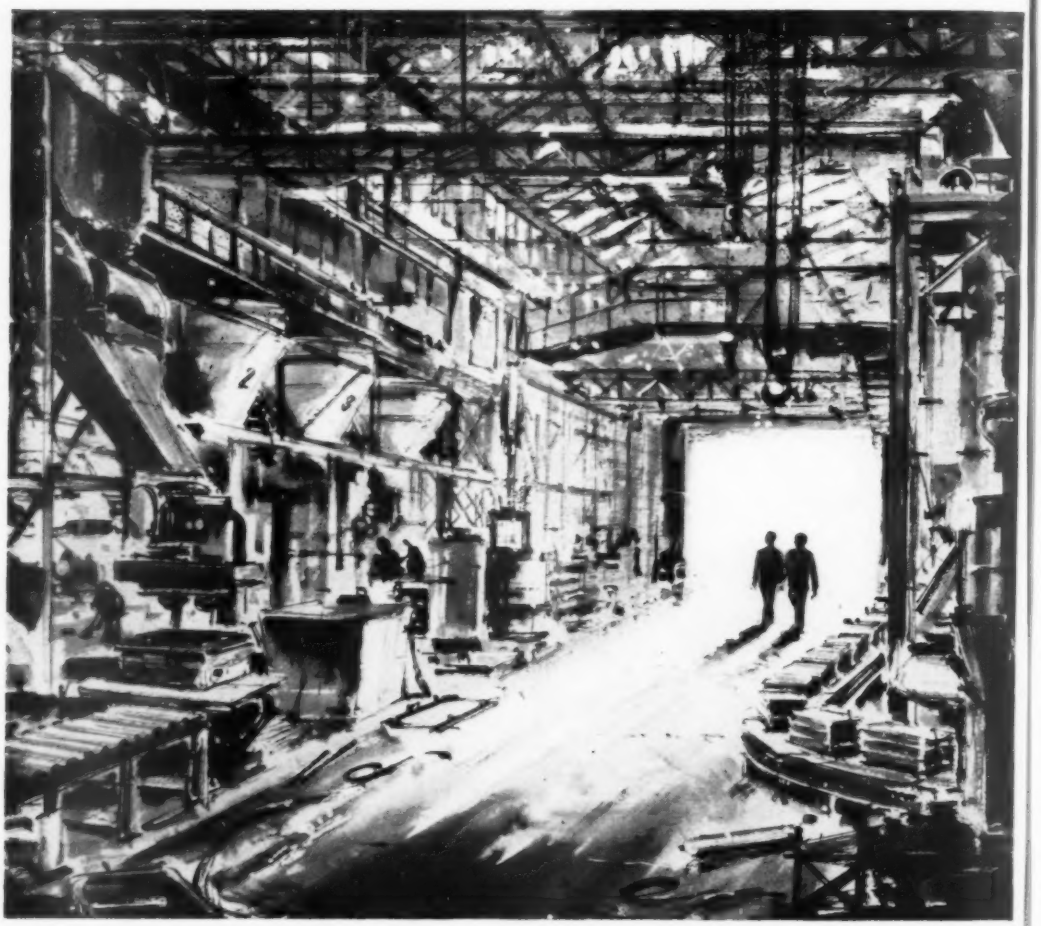

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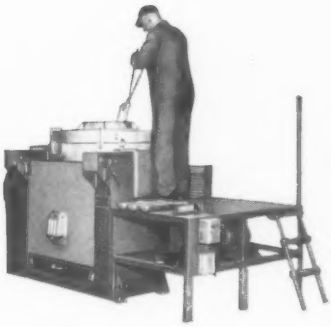

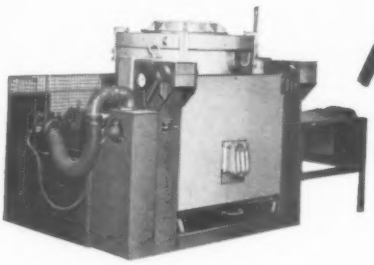

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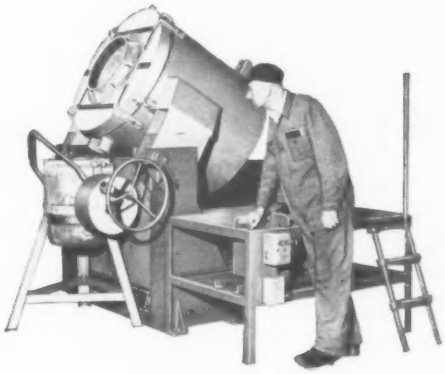

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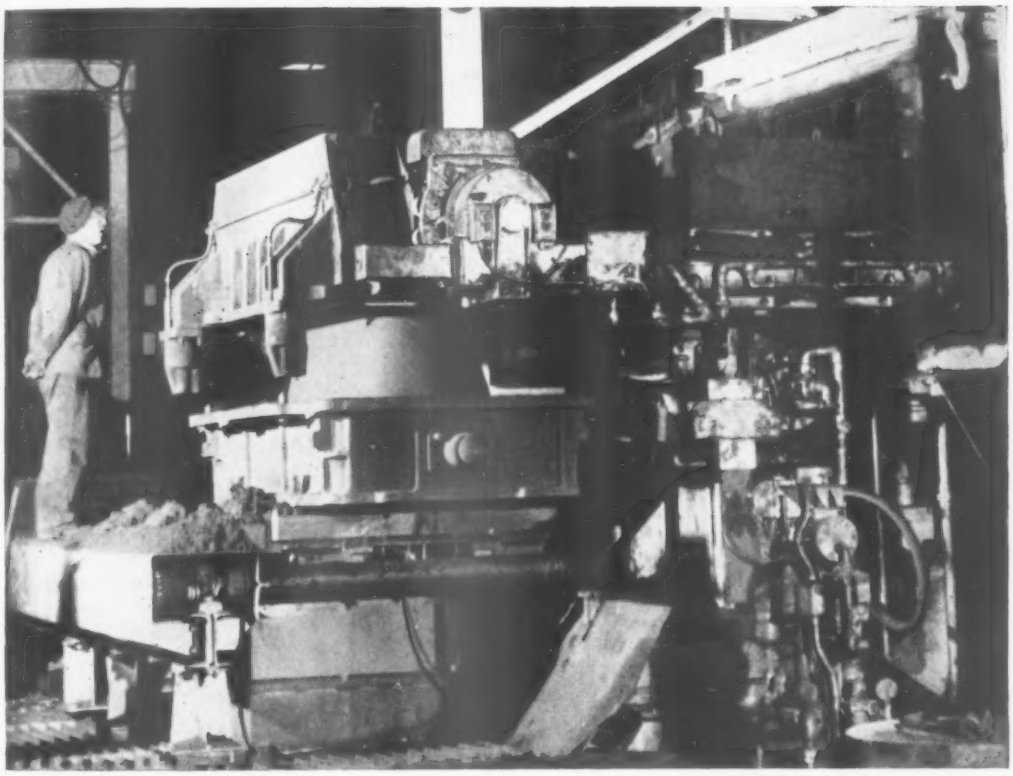

One pair of Herman machines makes 60 baths each hour in the foundry of British Bath Company Limited, Greenford. Picture shows drag machine rolled over.

Photograph by courtesy of British Bath Co. Ltd.

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Illustration (reproduced by courtesy of Messrs. BILSTON FOUNDRIES Ltd.) is similar to the one described above.

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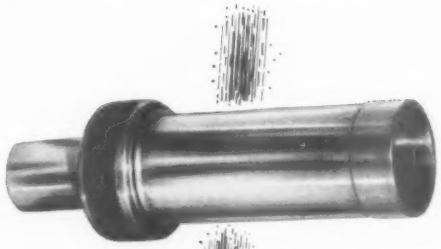
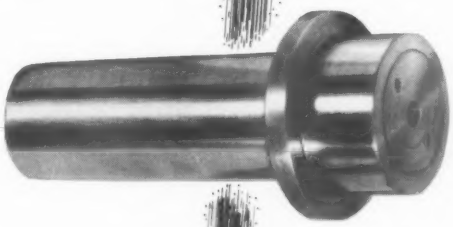
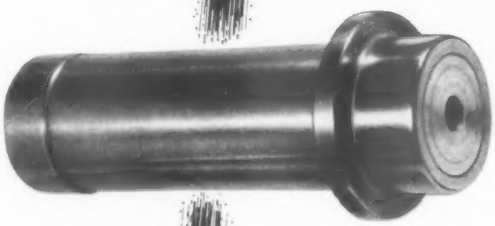


Perfection!



UNIBLAST



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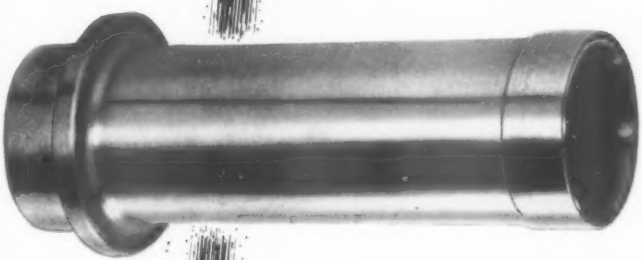

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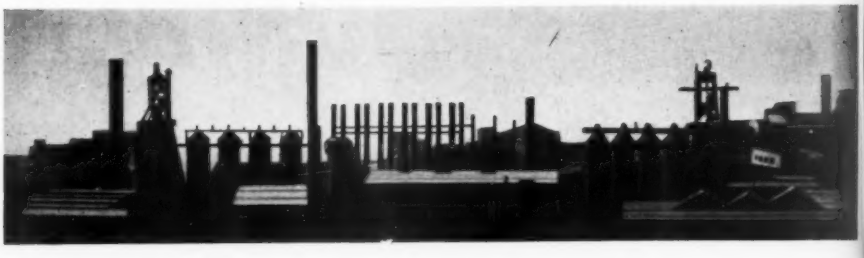

Answer consult Holmes

We have specialised in the design, manufacture and installation of dust collection and control plant for a good many years and today our range is second to none. Plant manufactured by our Gas Cleaning Division includes: Holmes-Elex Electrical Precipitators: Holmes Retroflux and Standard Bag Filters: the Holmes Schneible Multi-Wash System: Holmes-Rothemuhle Multi-Cell Cyclone Dust Collectors and Trion Electronic Air Filters. Enquiries normally entail visits to site by an engineer from our Test and Process Development Section to assess the particular problems involved and their solution in terms of the comprehensive range of plant which is available. Extensive laboratory facilities exist for the examination of dust and fumes, and, where necessary, arrangements can be made for pilot plant to be installed for trial purposes. Detailed technical brochures on all types of plant are available and can be had on request.

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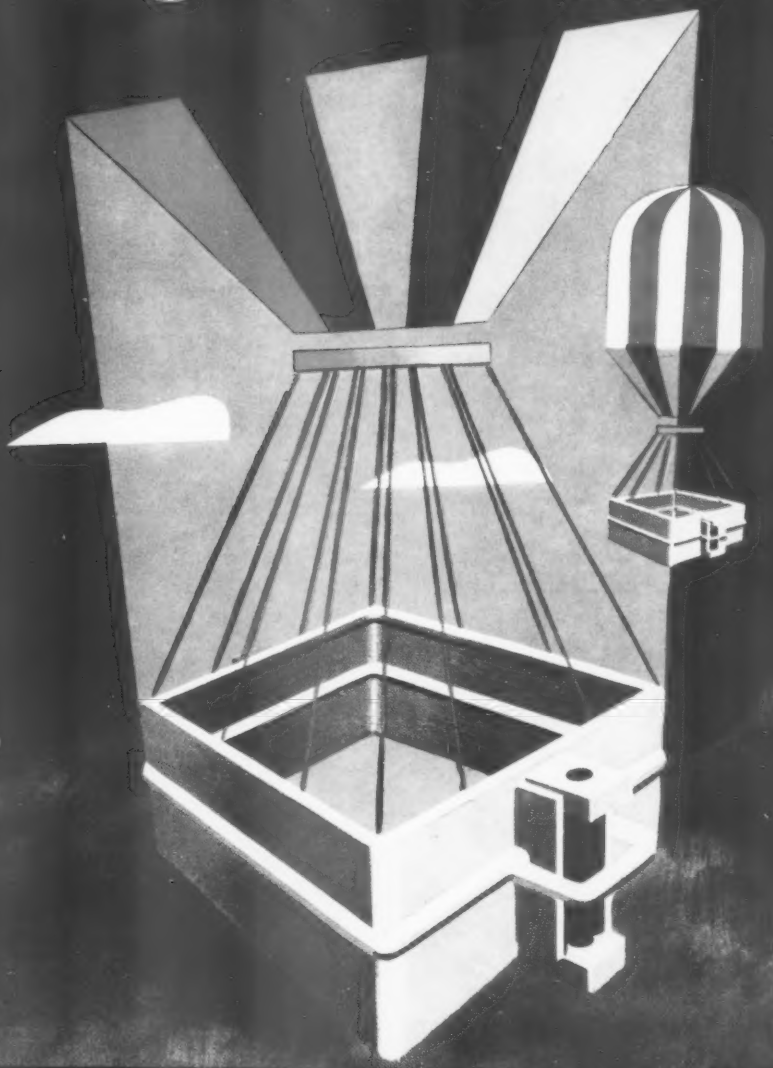

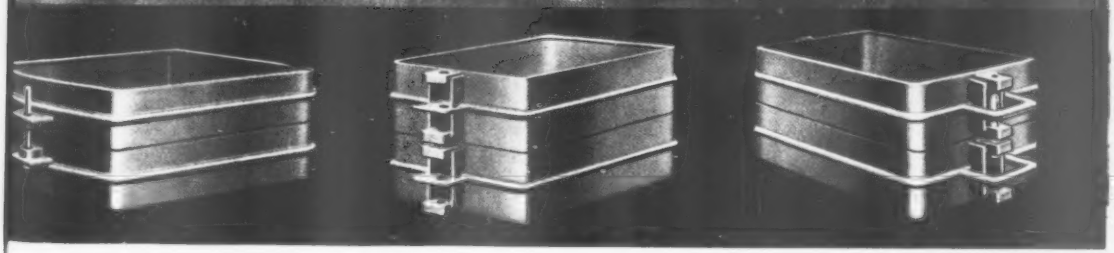

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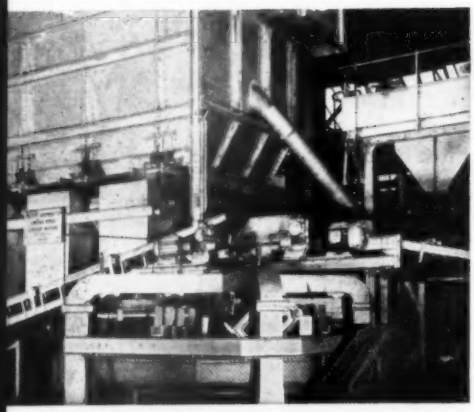

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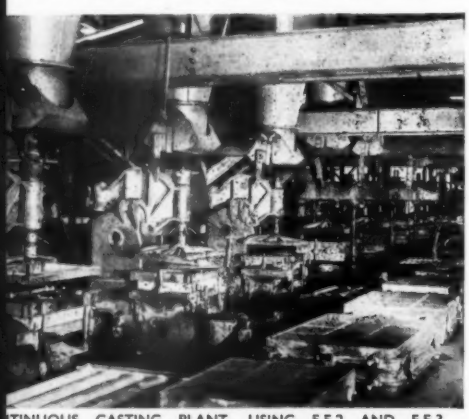

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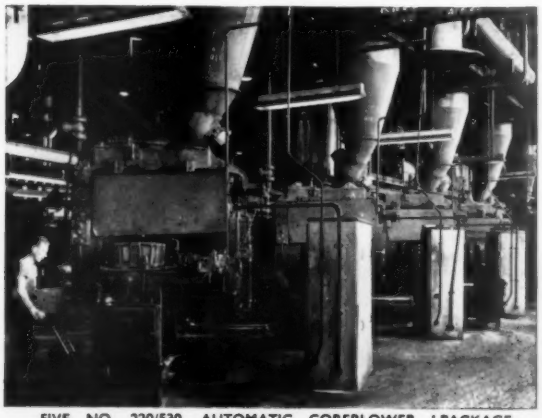

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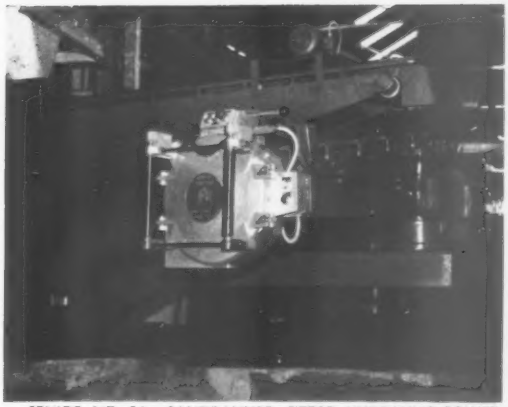

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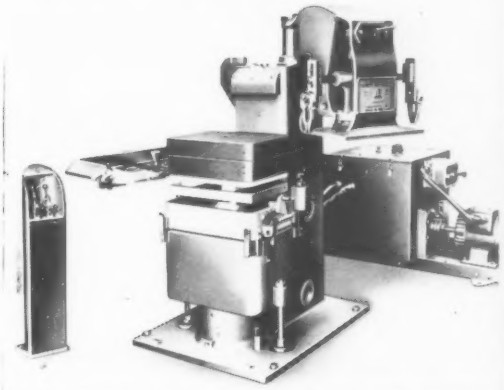

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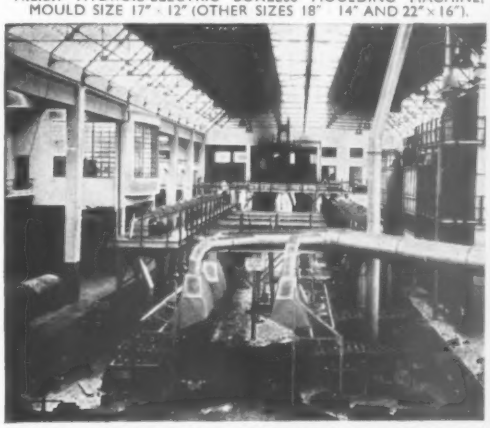

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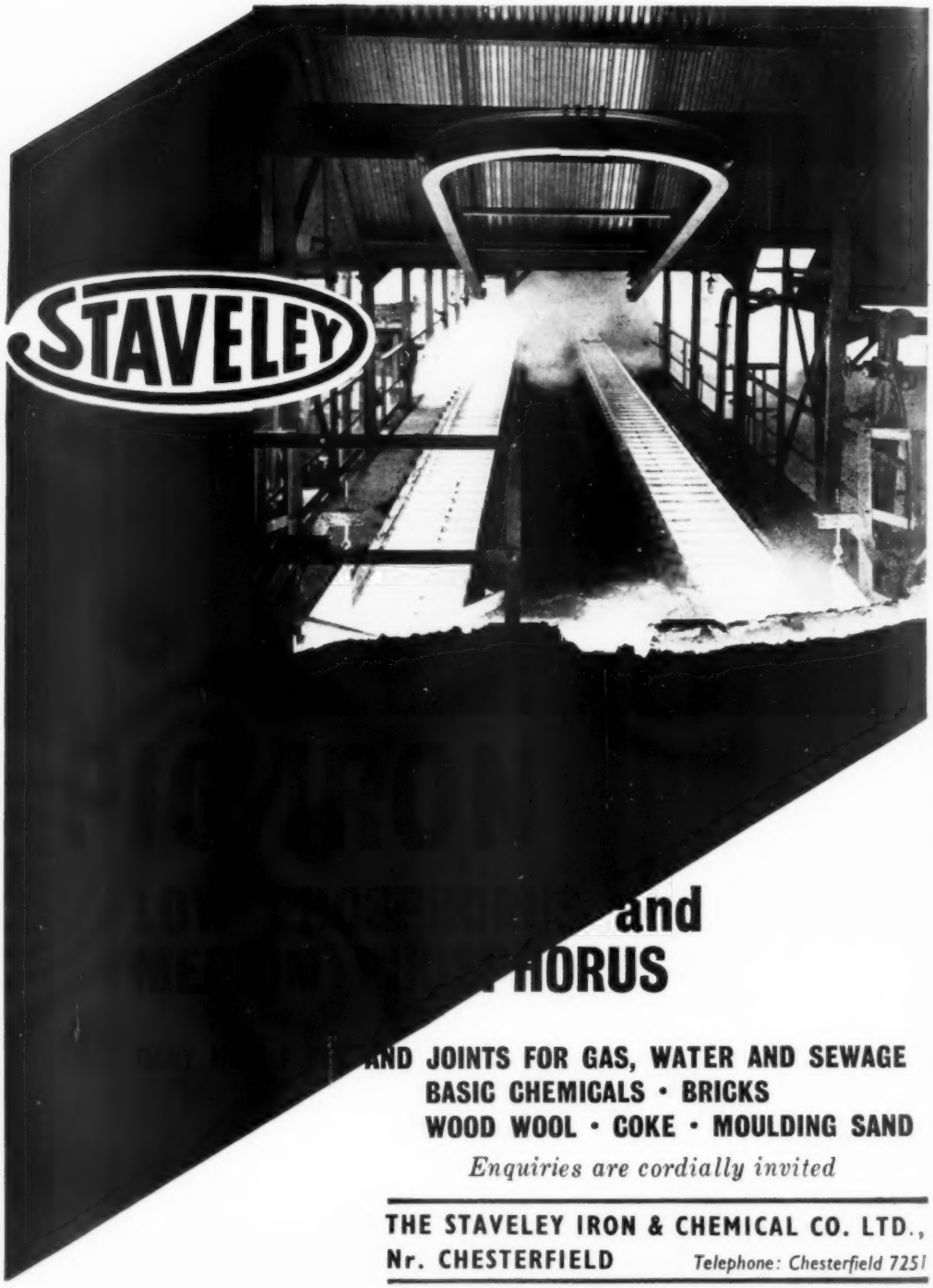

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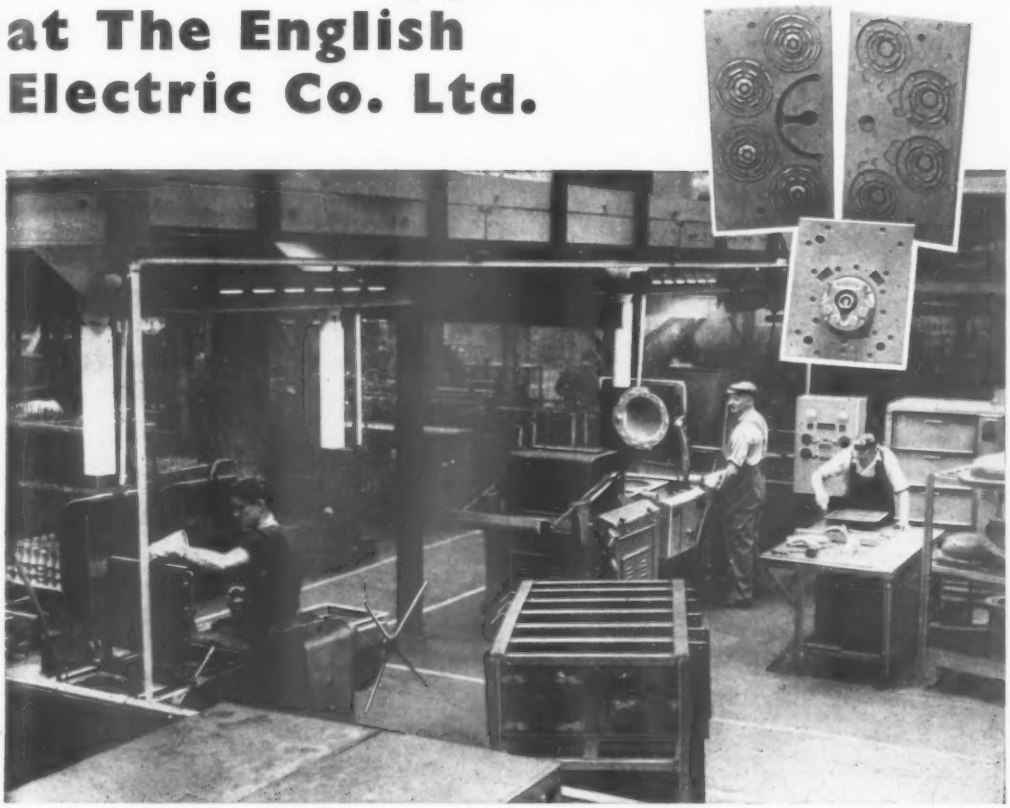
Another Polygram Installation at The English Electric Co. Ltd.



Photograph of a section of the Polygram Shell moulding equipment installed at the English Electric Company Limited, Bradford, Yorks.

Illustrations show a range of Shell Moulded Grey Iron Castings, previously produced by conventional sand moulding methods, on which substantial improvements and cost reductions have been made.

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Photographs by courtesy of the English Electric Co., Ltd.

Polygram Casting Company have a competent and complete service to offer, and your enquiries are invited.

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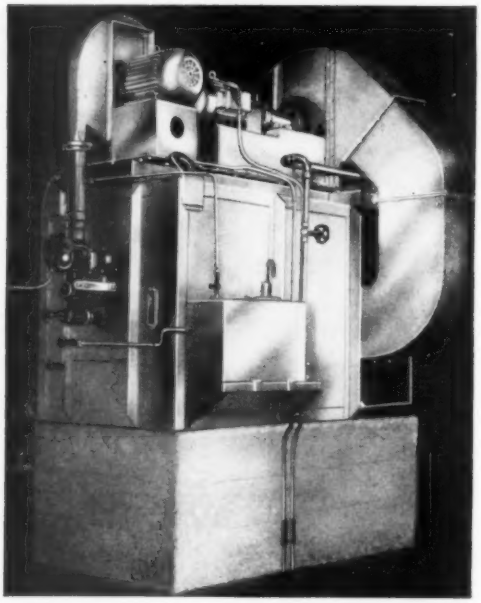

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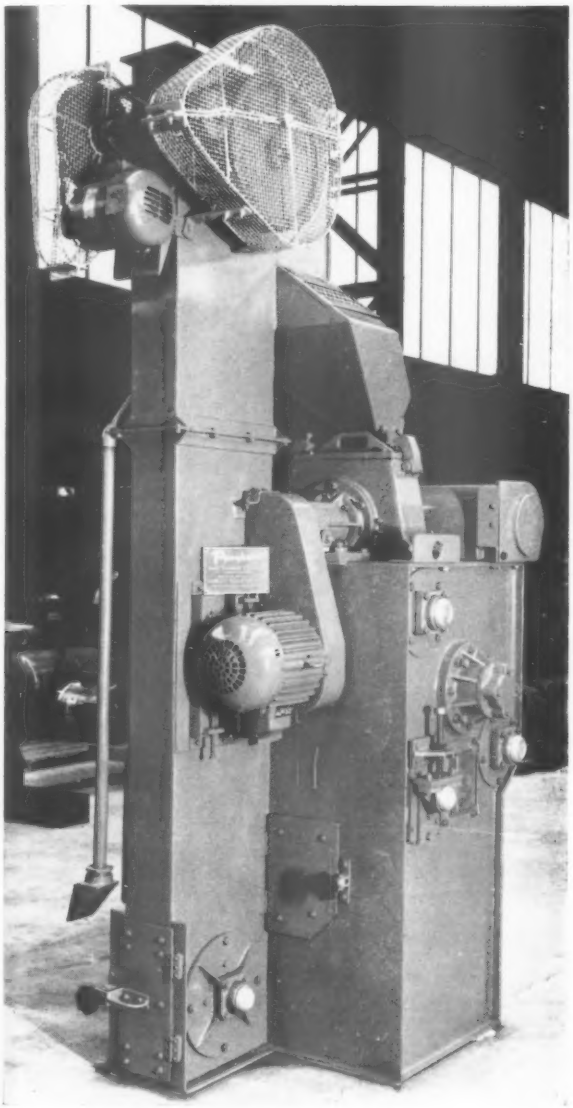

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The fastest method of cleaning castings!

AT
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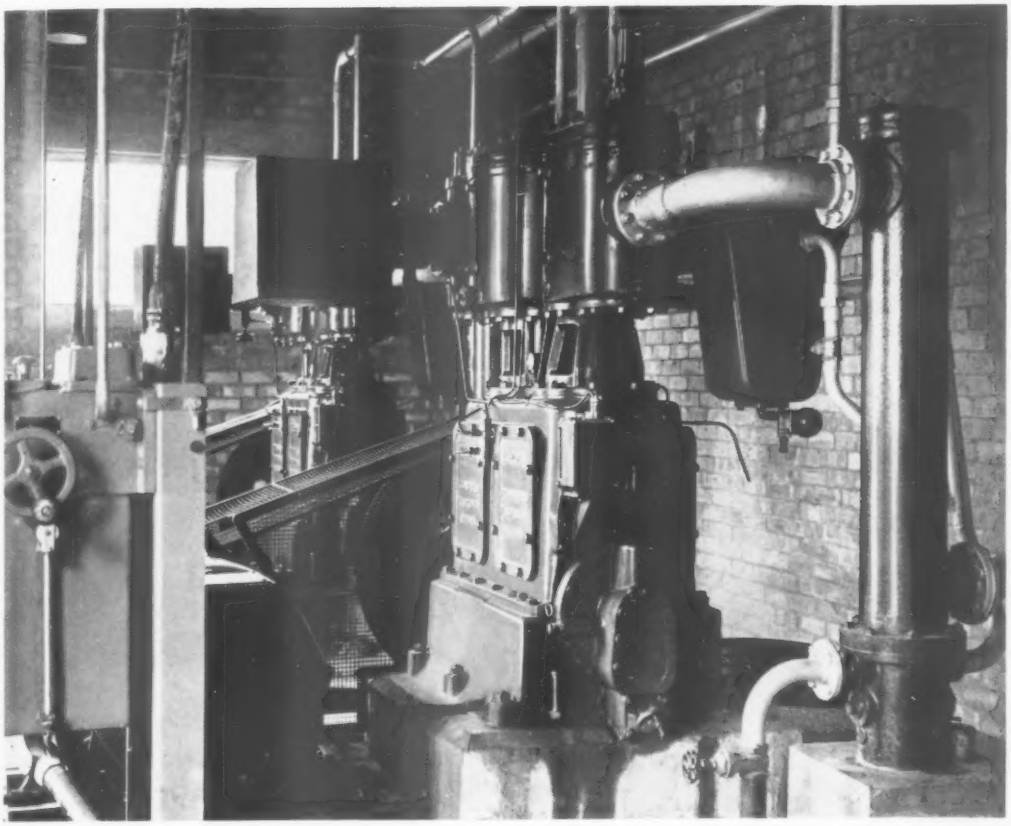

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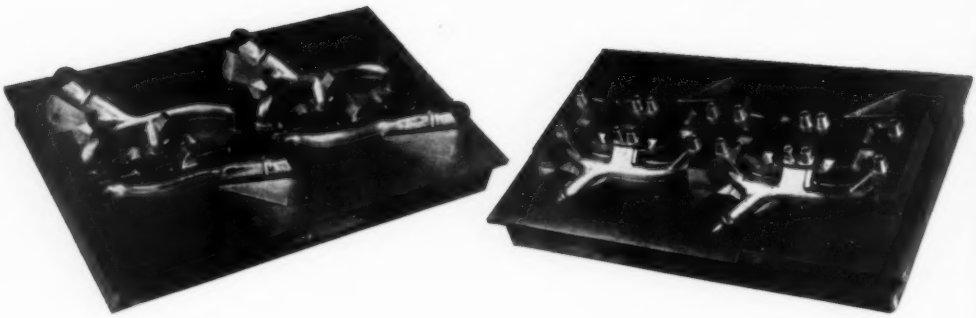

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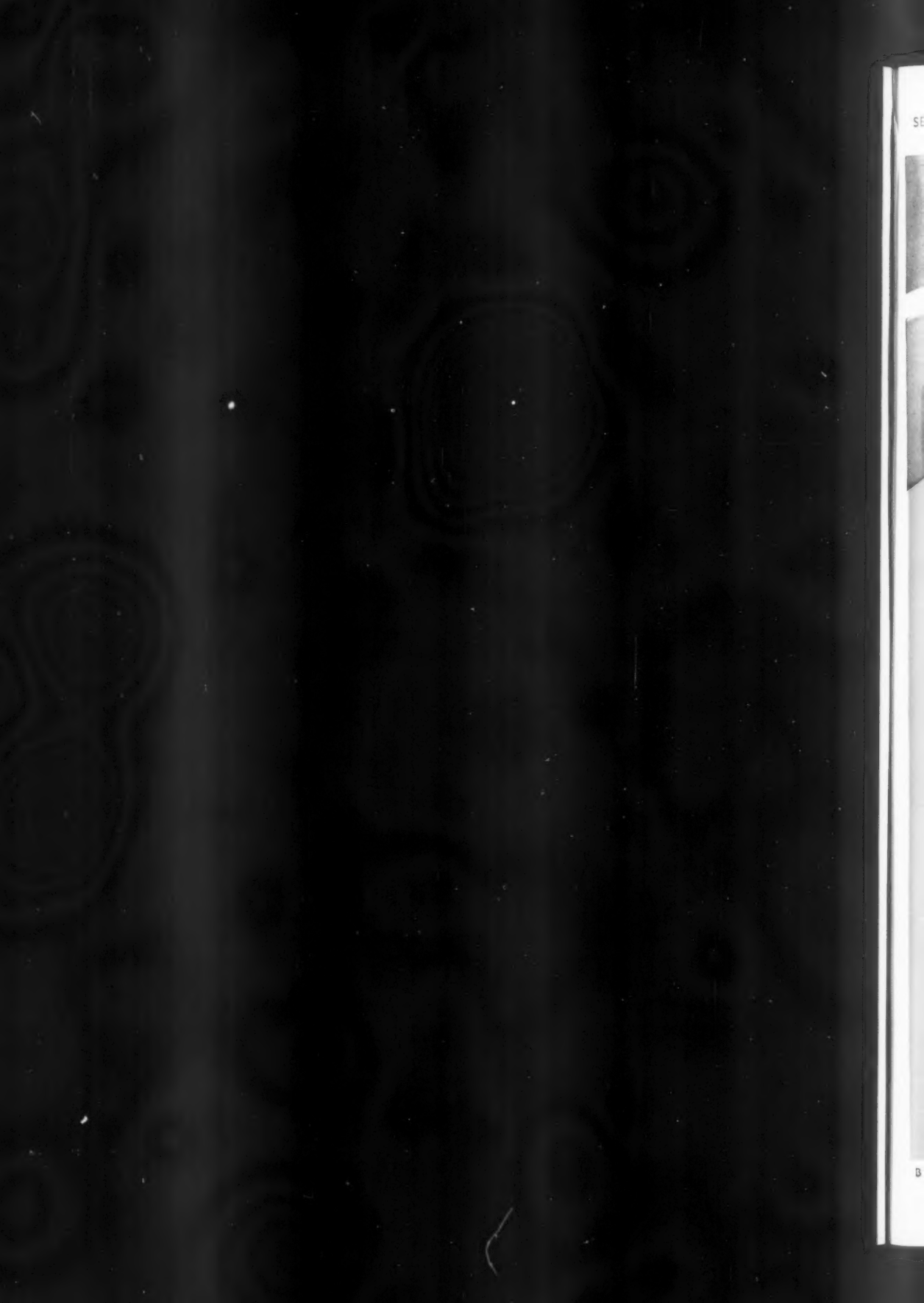

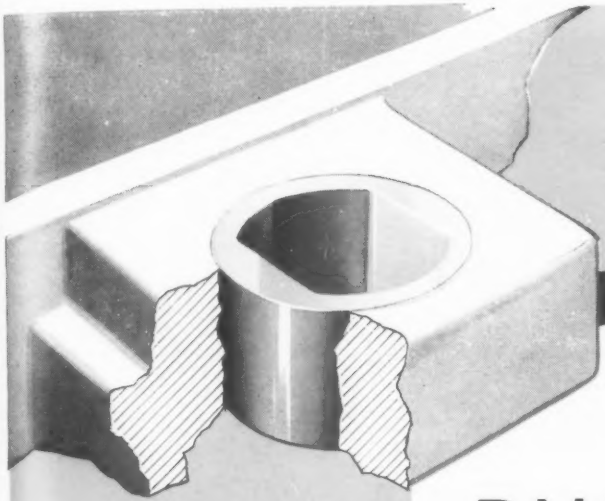

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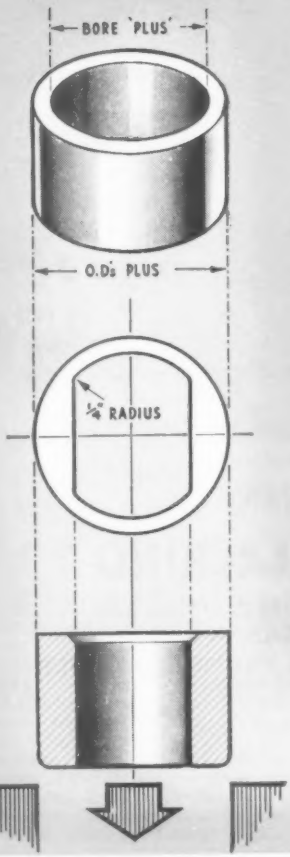

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The bush . . . *. . . . with 9 lives*

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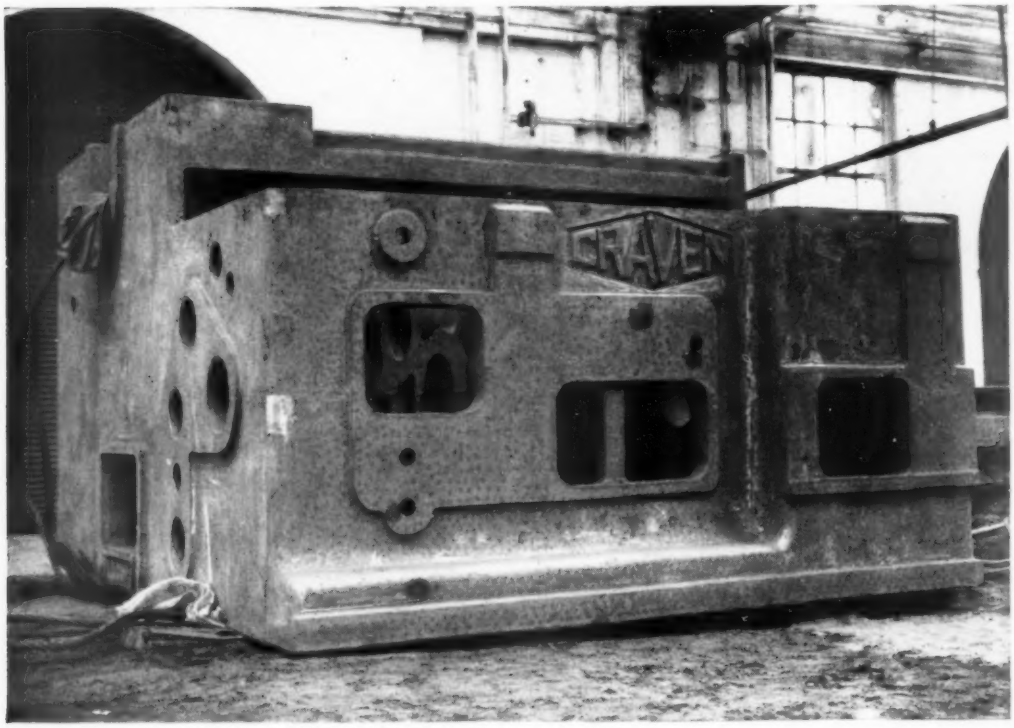

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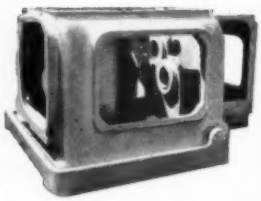
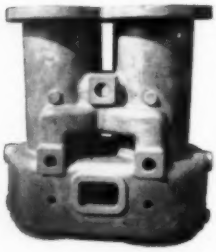
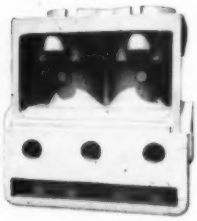
All these intricate iron castings were produced by Robert Cort & Son Ltd., Reading, using CO_2 for core and mould hardening and Isopropyl Alcohol as the base for the flash dressing. You can get this sort of result simply and consistently in your foundry too.







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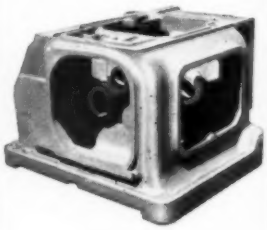

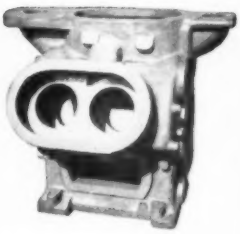

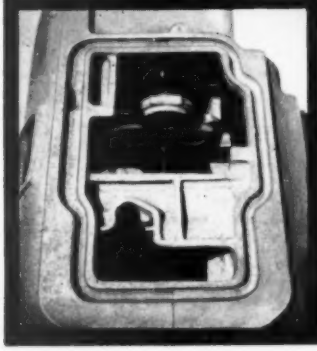

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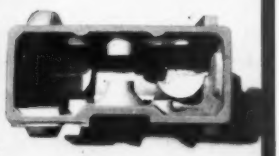

TA 2570

"But what IS Selective Particle Acceleration?"

"Just what it says—selecting dust particles by size in order to accelerate them to, but not beyond, the velocity required to collect them."

"How?"

"With SPA, the unique, multi-cellular, dry, centrifugal dust collector manufactured exclusively in the U.K. by Steels Engineering Installations Limited."

"Complicated, I suppose?"

"On the contrary, quite simple. And moderately priced, too, besides which, due to the principle employed, erosion is practically eliminated, giving SPA a much longer life than the majority of dust collectors."

"But would it meet my requirements?"

"Unquestionably! So flexible is SPA and so comprehensive the design and advisory service offered by Steels, that practically any dust problem can be solved simply by ringing SUNDERLAND 56281."

"Come to my office—we'll discuss it in detail."

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DUST EXTRACTION

STEELS ENGINEERING INSTALLATIONS LIMITED SUNDERLAND & BIRMINGHAM 671

new Impregnation Process for Porous Castings

THE NEW MOGUL

CAST SEAL PROCESS

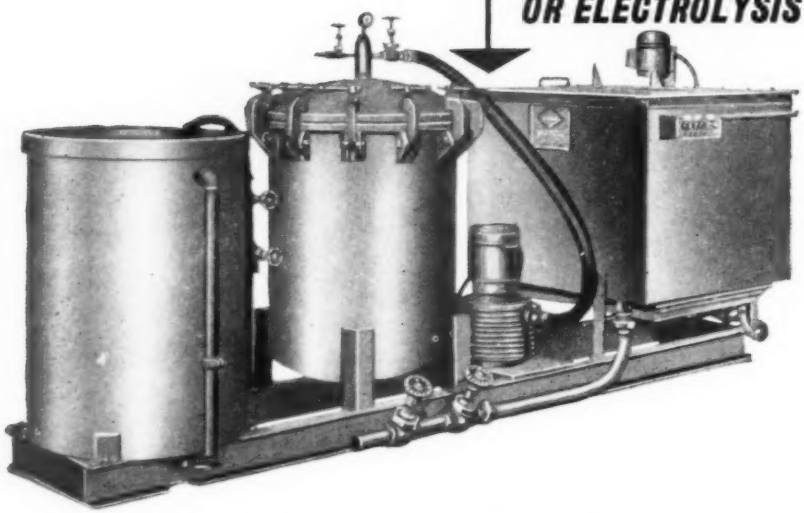
IMPREGNATES CASTINGS

WITHOUT BAKING

WITHOUT DISCOLOURATION

WITHOUT RUSTING

OR ELECTROLYSIS



The MOGUL CAST-SEAL Impregnating Process utilises a metallic colloidal solution, which is pressurised round and through the castings and permanently seals leaking and porous places. The solution penetrates into the leaks and builds up a metallic seal right through the wall.

Ferrous and non-ferrous castings can be treated in 45 minutes without preparation (other than de-greasing where necessary), and do not require subsequent baking or cleaning. The process does not affect the appearance of the castings in any way.

An Impregnating service to the trade is operated at Sheffield.
Patented by the Metallizing Company of America.
Manufactured in France by the RONCERAY *Group of Companies.*

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cores

blown
hand-rammed
extruded
sand-slung
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The binder for them all is THOR SB-109. A versatile binder, indeed; and what is more, this Phenol/Formaldehyde resin is also extremely tolerant of sand condition. Thus it is the answer to the problem of finding a binder which can be used with hot sand (and also wet sand) and still give excellent performance.

Note, too, these other advantages of THOR SB-109:

- It can be used in the hot core-box technique to produce dimensionally stable cores, ready for use, in 2 minutes.
- Suitably diluted, it can be used as a mould or core spray to give superior casting finish.
- It can be used in sand mixes made in any normal foundry mixer and, suitably adjusted, will perform satisfactorily under the most exacting foundry conditions.

Other Core Binders in the THOR range include:

THOR SB-14: A high performance, special purpose U/F resin binder.

THOR M-1288: A complete binder imparting both green and dry strength.

THOR M-1326: An air-setting resinous binder of high performance.

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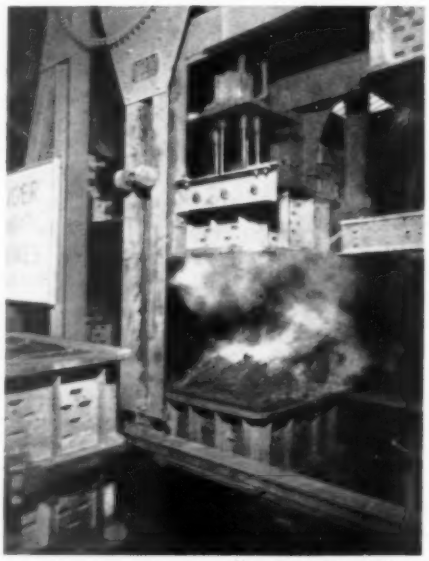

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PIG IRON

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FOR HIGH DUTY CASTINGS

CHILLED IRONS
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In 15 ton casts direct from receiver to required analysis

Castings made from these irons have greater density and toughness. You will have fewer rejections, greater freedom from cracks, breaks and other defects.

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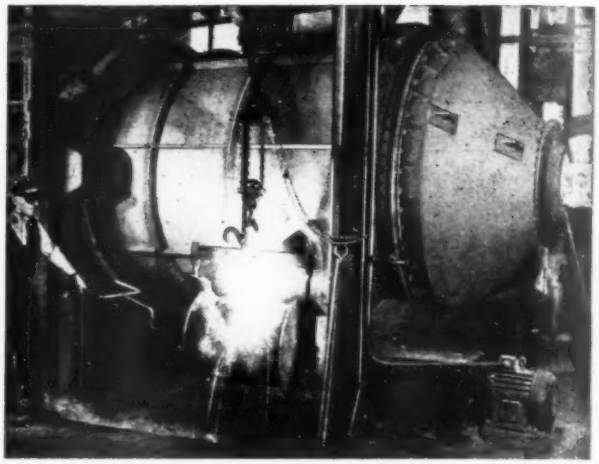

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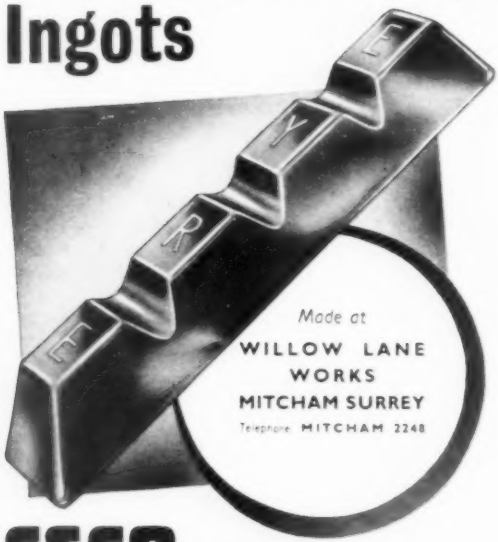

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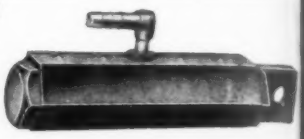

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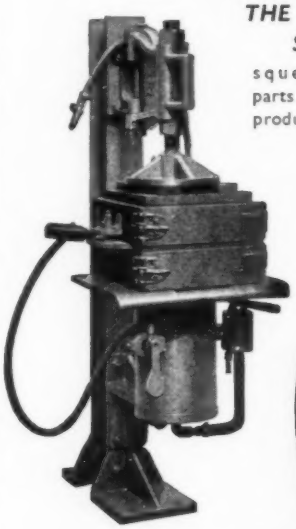

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This Machine, despite its low price, produces cores up to 9 lbs. as rapidly and efficiently as machines costing several times as much.

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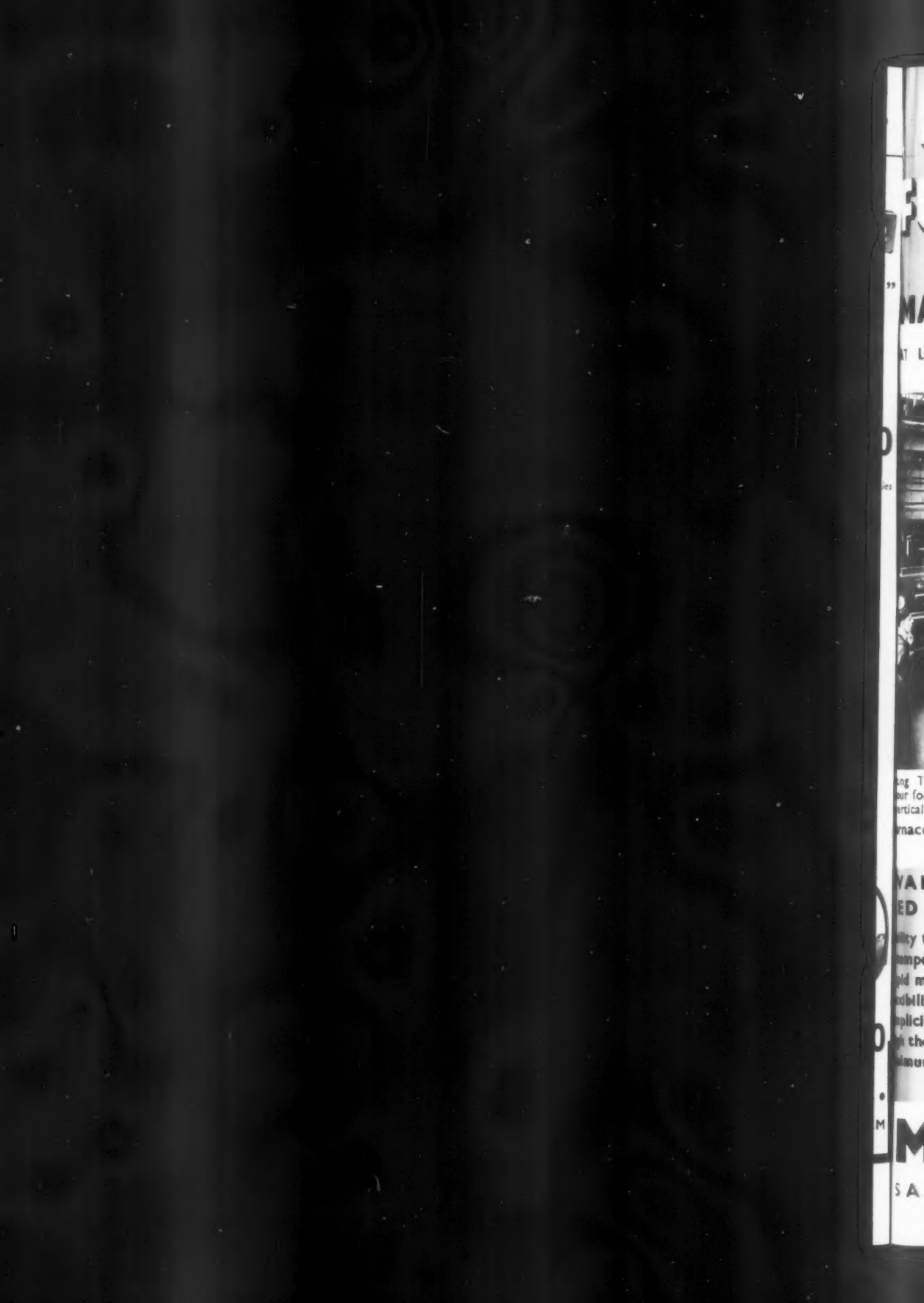

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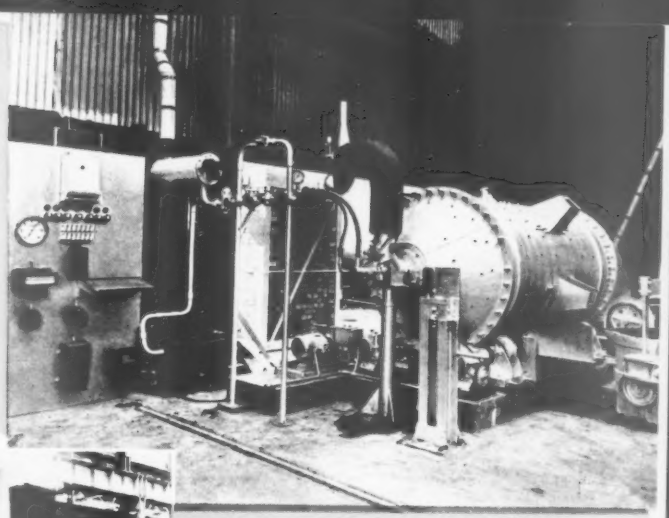

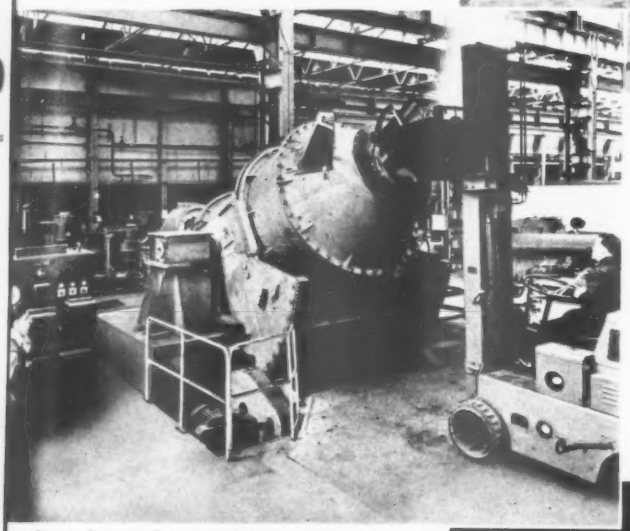

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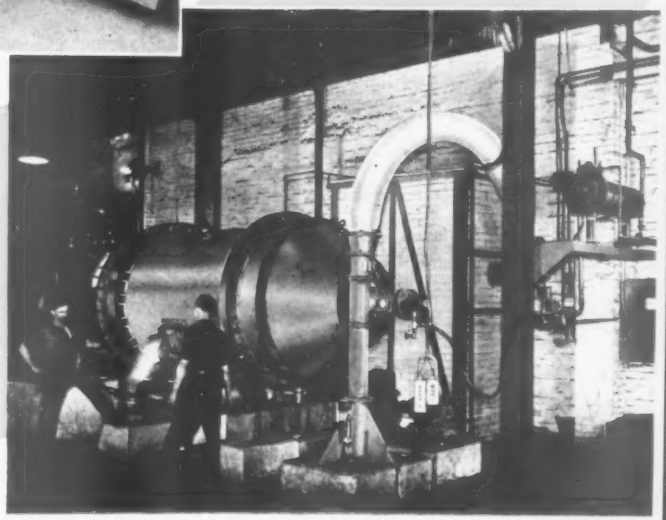

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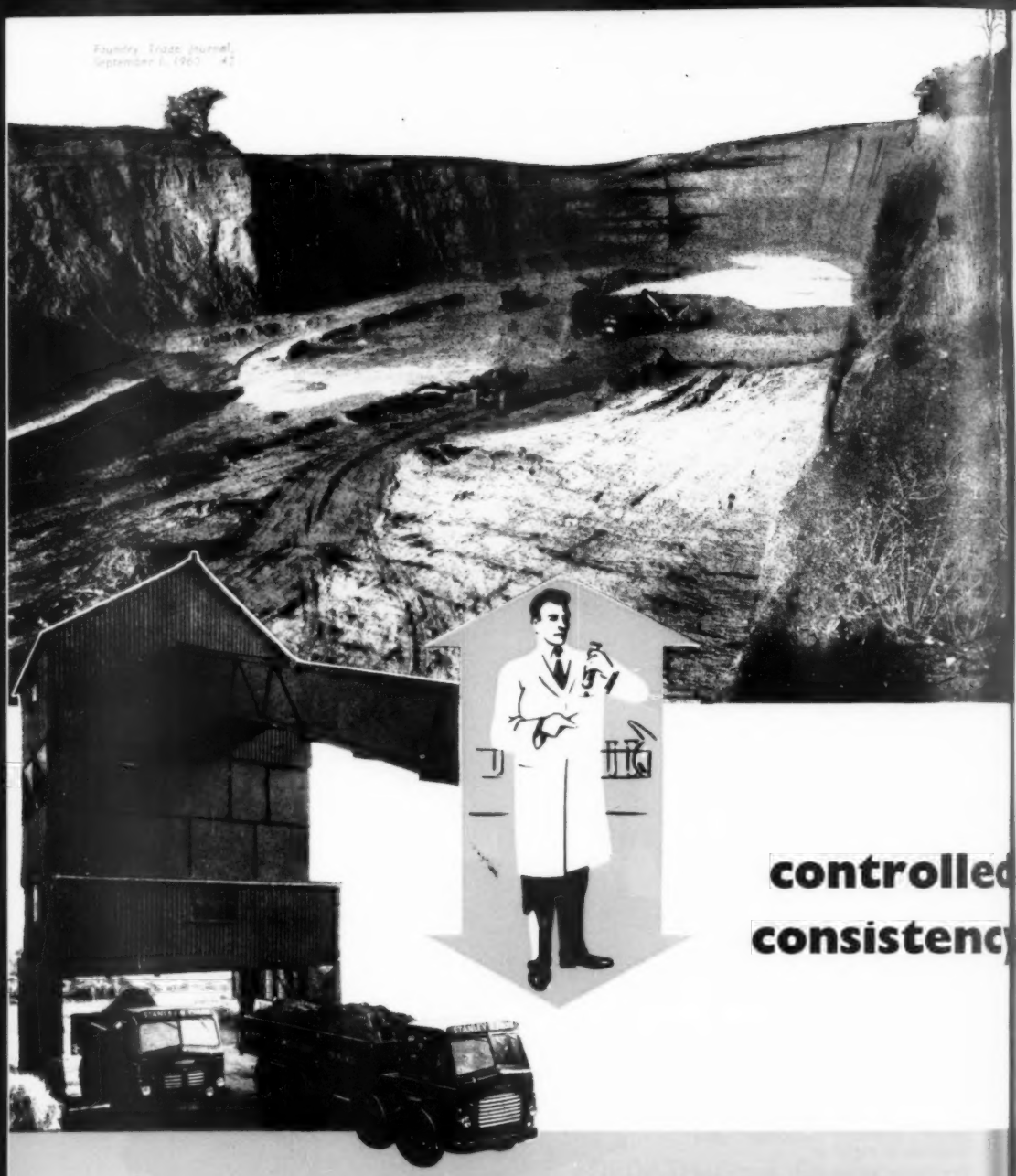

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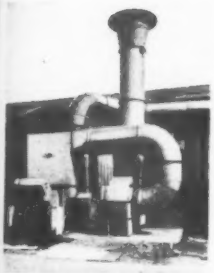

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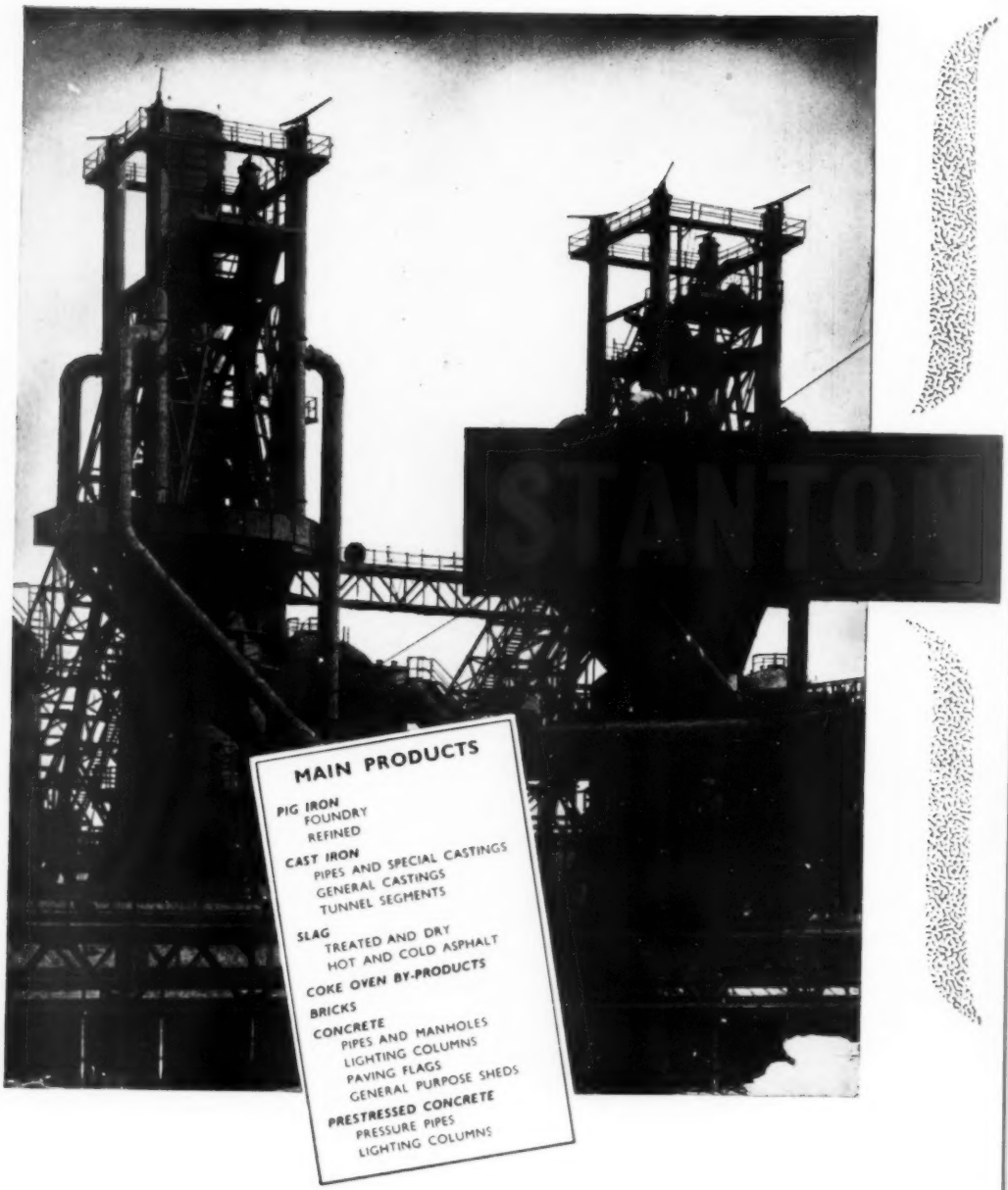

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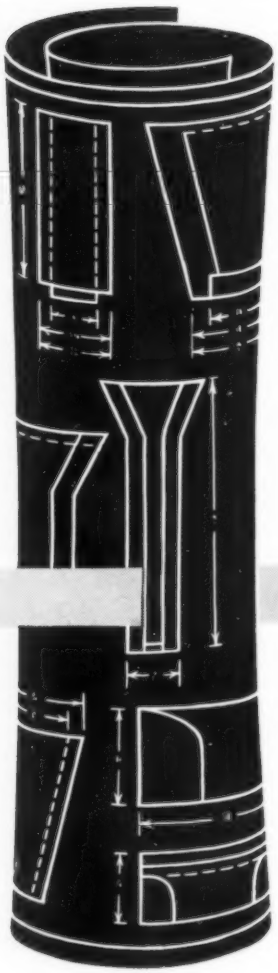

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TRADE JOURNAL
Vol. 109 September 1, 1960 No. 2282

Proposed New System of Technical Training

The Ministry of Education has recently issued a circular (No. 9/60) to all the major establishments for further education, suggesting improved methods of co-operation with industry. This it is stated is exceptionally important during the next few years in order adequately to deal with the " bulge " of school-leavers. The five-year course of secondary education is deemed to-day to be an essential requirement for the creation of an intelligent adult population. It is suggested that during the fifth year, where insufficient accommodation is provided in secondary schools the last year's training may be given in a technical college instead, especially where one-year courses of this type already are in being. By this arrangement, it is postulated that technical colleges could relieve industry of some of the tasks involved in the early training of apprentices.

In many cases, we fear extension of college committments is wishful thinking, as not only are the technical colleges overcrowded and understaffed, but in recent years there has been a tendency to " hive off " both craft teaching and preliminary subjects and concentrate on the more advanced technologies. Thus, before the Ministry can hope to implement this scheme, it will have to envisage an extensive building programme. The circular suggests as an alternative to extensions, the acquisition of temporary buildings, which could be adequate for the period covered by the " bulge years." The disadvantage of such a system is that the students so housed " feel out of it " and fail to participate in the social and cultural activities of the college, and thereafter have no particular desire to " wear the old school tie."

As for staffing and equipping, the circular suggests that close co-operation with industry could overcome the obvious difficulties, by firms loaning appropriate members of their staff as part-time lecturers and providing the essential plant for the carrying out of craft training. However, it is obvious that the suggested system is an improvement on the day-a-week release of juvenile staff. As the matter stands at the moment, it would mean that the technical colleges will have to make intensive propaganda with their local industrialists for acquiring support for the training of young people, who may or may not join their staff on the completion of the training given.

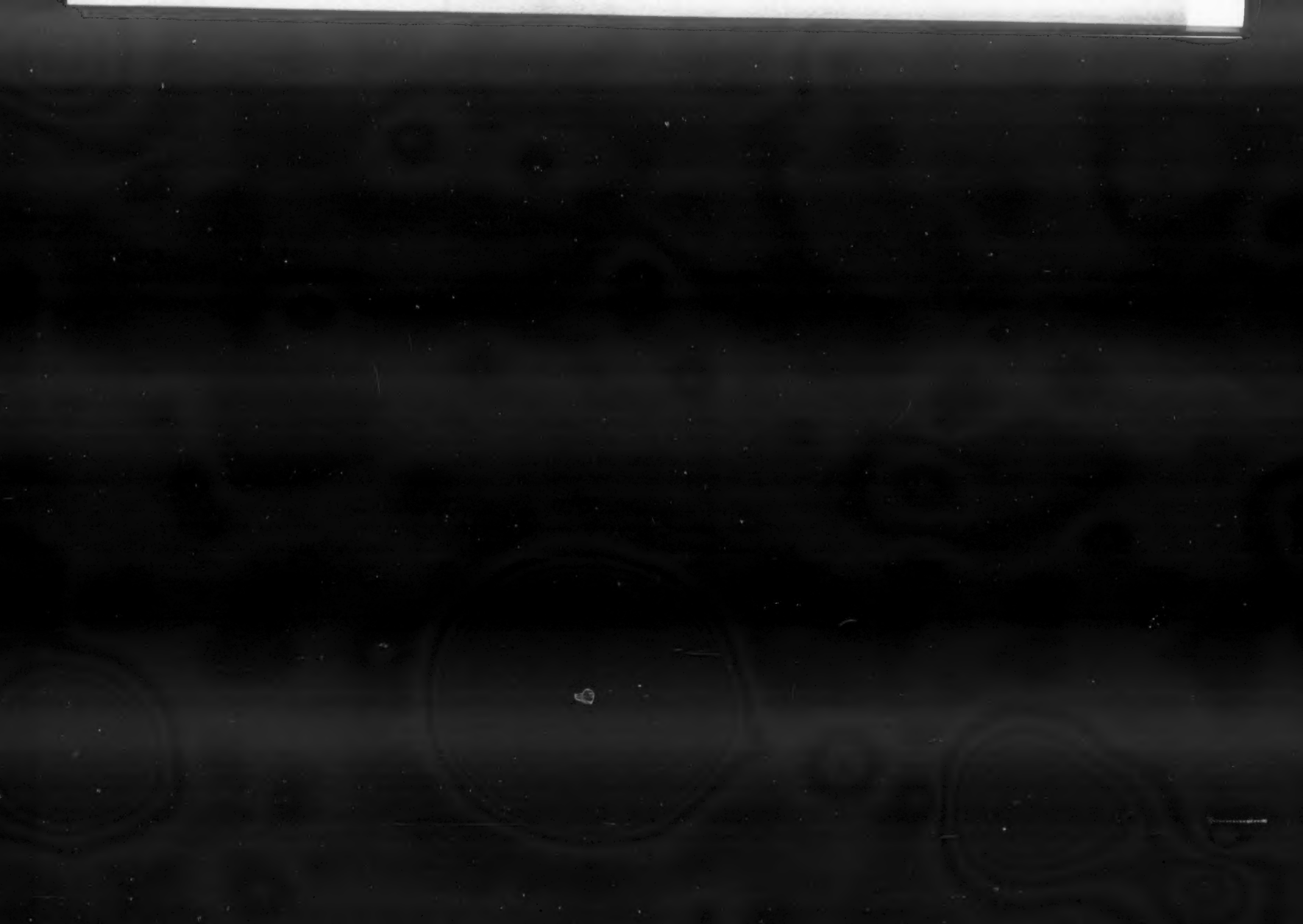
Featuring . . . .

MR. G. S. STEVEN

MR. G. S. STEVEN, chairman and joint managing director of Allied Ironfounders, Limited, has had a long connection with the foundry industry, having started with the Allied group when he joined McDowall, Steven & Company, Limited, Falkirk, in 1925. Subsequently, he was associated with the development of the group's productive capacity at various centres in both Scotland and England. He was appointed deputy managing director in July, 1954, and became managing director in November, 1956, vice-chairman and joint managing director in April last year, and chairman in April this year.

Mr. Steven who is 53, received his early education at Marlborough College and started his business life when he was 18. Nowadays, he epitomizes the modern executive who, as a result of personal first-hand experience, possesses a thoroughly practical insight into the operations of a large industrial firm—Allied Ironfounders control 30 or more companies in the United Kingdom and South Africa. His short periods of relaxation from the calls of business, Mr. Steven devotes mainly to tennis and shooting.

. 1960



G. S. STEVEN

Chairman and Joint Managing Director, Allied Ironfounders, Limited

International Foundry Congress

Parties to a total of over 80 persons from the United Kingdom will travel by air, boat/train or make boat/road journeys converging at Zurich, Switzerland, for the twenty-seventh International Foundry Congress which is being held there from September 19 to 24 (see programme details, JOURNAL, May 19 and June 30). The party from the UK includes the president, senior vice-president, secretary and five past-presidents of the Institute of British Foundrymen. It is anticipated that French, Italian, German and other European participation will be considerable, a number of American delegates are expected and most other countries (out of the 22 nations who are members of the International Committee of Foundry Technical Associations) will be represented.

Simultaneous technical sessions for a total of 24 papers will be held in two lecture-rooms under the general heading: "Improved working conditions and technical advancement in foundries" and will fall into three groups: (1) Recent results of foundry research; (2) modern working methods in the foundry, and (3) man and the foundry. In addition, a special series of excursions has been arranged for the ladies. The annual banquet will be held on the Wednesday and the official closing ceremony and presentation of the Award of Honour will take place on the Saturday. Thursday is to be devoted to a sightseeing excursion and following the Congress, there is a selection of three post-Congress tours, each of three days' duration.

Forthcoming Events

Association of Bronze & Brass Founders

SEPTEMBER 6

Scottish area: Meeting at the North British Hotel, George Square, Glasgow, following luncheon at 12.30 a.m. for 1 p.m.

Institution of Plant Engineers

SEPTEMBER 6

London branch:—"Pneumatic Transfer Machinery and Circuitery," by D. C. Evans, 7 p.m., at the Royal Society of Arts, John Adam Street, Adelphi, Strand, W.C.2. (Tea precedes lecture at 6.30 p.m.)

SEPTEMBER 7

Leicester branch:—"On Schedule," film and discussion, presented by F. W. L. Heathcote, 7 p.m., at the Saracen's Head Hotel.

SEPTEMBER 8

Glasgow branch:—"Factory Fire-alarm Systems," by W. Roby and R. S. C. Dougall, 7.15 p.m., at the Scottish Building Centre, 425, Sauchiehall Street.

North-East branch:—"Electrical Power Distribution," by J. E. Finn, 7 p.m., at Roadway House, Oxford Street, Newcastle-on-Tyne.

Latest Foundry Statistics

Copper-base Castings: The British Bureau of Non-Ferrous Metal Statistics in their latest *Bulletin* state that the output of copper-base castings during June was 7,379 tons, a figure well above the monthly average for the year. The first six months of 1960 show the production of 43,977 tons which is 7,332 tons higher than in the similar period in 1959.

Stainless-steel Tuyere Blowpipes for "Queen Bess"

A supply of Centrispun tuyere blowpipes has recently been produced and delivered by Firth-Vickers Stainless Steels, Limited, to Appleby-Frodingham Steel Company, of Scunthorpe, for fitting to the "Queen Bess" one of four blast-furnaces at the firm's South Ironworks. They will be used for injecting pre-heated air at the rate of 85,000 to 90,000 cu. ft. per min. at a temperature of 750 deg. C. and a pressure of 30 lb. per sq. in. It is expected that the output of the "Queen Bess" will be of the order of 8,500 to 9,000 tons of pig-iron per week (though during the course of the next two years when it is anticipated that the working temperature will be stepped up to 900 deg. C., a production increase is expected).

Centrispun blowpipes produced in H.R. Crown I alloy steel have been used successfully in the industry for more than three years and are now in regular production in the Firth-Vickers centri-spinning foundries. The original blowpipes produced in this material were fabricated from four individual spinnings, but the makers who pioneered the centrispinning process, have since developed new techniques which have made it possible to produce a blowpipe in one piece from a special die. Experience has proved that blowpipes manufactured from this material give many times the service life of those produced in mild steel or hematite iron and ultimately reduce replacement and maintenance costs. (The illustration alongside shows loading of a consignment of blowpipes.

Application of Chilling and Heat-insulating Materials in Steelfounding*

By F. D. Obolenzew

With steel castings which are liable to the formation of shrinkage cavities, correct feeding during solidification plays a decisive part in the quality obtained. Up-to-date knowledge of shrinkage-cavity formation, and the positioning of feeder-heads, is essential in the production of sound castings.

In present-day steelfounding practice, the ratio of sound castings to metal used is often small, due to the large amounts of steel taken up by the feeder-heads. Heavy expenditure is usually necessary in cutting-off heads, and in arranging for special additions, such as webs and pads, to the casting (Fig. 1). If a casting has parts of irregular cross-section and thick sections which retain heat for a long time, it is usually necessary to place a feeder-head on each such section to ensure adequate feeding. This means heavy consumption of molten steel. The positioning of the feeder-heads is complicated if the thicker parts are situated in the lower section of the casting and the various methods of increasing pressure are not always adequate. To ensure sound steel in the thicker parts of the casting in the lower half of a mould, one can use an internal chill. This method, however, is not suitable for highly-stressed sections. To ensure a high quality in all sections of the casting, adequate feeding is essential.

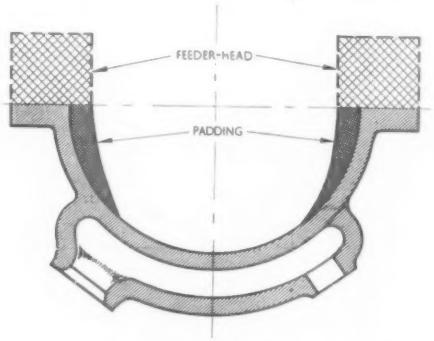


FIG. 1.—*Example of how directional solidification can be secured by means of padding.*

Many cases are known in practice in which special substances are added to achieve the desired controlled solidification in stressed areas (Fig. 1), but these often cause unnecessary processing. When large feeder-heads are used, only a small number of castings prone to the formation of shrinkage cavities can be expected, but it is also necessary to have sufficient hydrostatic pressure to enable the liquid steel to flow into the areas of shrinkage. There must also be an adequate supply of liquid steel in the feeder-head during the whole period of the solidification of the casting. To keep the dimensions of the feeder-head as small as is consistent with these requirements, artificial pressure can be used. From the point of view of conserving heat, the shape of feeder-heads should approach the optimum form, *i.e.*, a combination of a hemisphere and a cylinder, the height of which equals its radius. Despite the use of this advantageous shape, the efficiency ratio of head to casting weight is still small. Therefore, a further decrease in head dimensions, and the expense of introducing means to reduce its cooling rate in comparison with that of the casting, becomes of practical significance.

Chilling Media

To determine the values of the chilling action of various mould and core materials, four groups of raw materials were tested at the Leningrad Polytechnic Institute's foundry laboratory:—(1) Metals (copper alloys, cast iron—cast and as borings); (2) materials with high thermal-conductivity as compared with a sand mould, from which one would expect an increased chilling action (silicon-carbide, of various grain-sizes, magnesite, zircon, chromite, and chrome-magnesite); (3) sand moulds (green and dry), and (4) materials of low thermal-conductivity, from which a smaller chilling action than that of the mould would be expected. This last group comprises heat-insulating materials and two types of these were examined:—(*a*) substances, the heat-insulating properties of which depend on their low thermal-conductivity, *e.g.*, chamotte and other refractory porous materials, and (*b*) heat-insulating substances which not only have a low thermal-conductivity, but also evolve a certain amount of heat during heating *e.g.*, sand with wood-sawdust, coal, Thermit, etc.

Slush-casting Experiments

The chilling action of the various materials was divided into periods of time according to the depth of the solidified layer of metal—carbon steel and Buntmetall* being the metals cast experimentally. The thickness of the solidified layer was determined by pouring out the non-solidified material from

* From an original in Russian, this translation is made available by the British Steel Castings Research Association. The paper was presented at a symposium on high-grade steel castings, and was intermediately translated into German, edited by N. S. Krestchanowski.

* Buntmetall—a copper/lead z c/tin/nickel alloy.

hexagonal or square moulds, with a side length of 70 mm. (2.7 in.), made so that four or six moulding materials could be tested under identical conditions in one test. By means of this simultaneous testing, the influence of variation in the temperature of the steel or other metal poured into the mould, when comparing the different materials was excluded. The materials listed earlier were tested in the form of chills, *i.e.*, plates of dimensions 200 by 70 by 20-mm. thick; their chilling action is shown in Fig. 2. Numerical values assigned to the chilling effect can, of course, vary according to the investigational criteria (casting temperature, composition of the metal, etc.), but the comparison values as such remain constant.

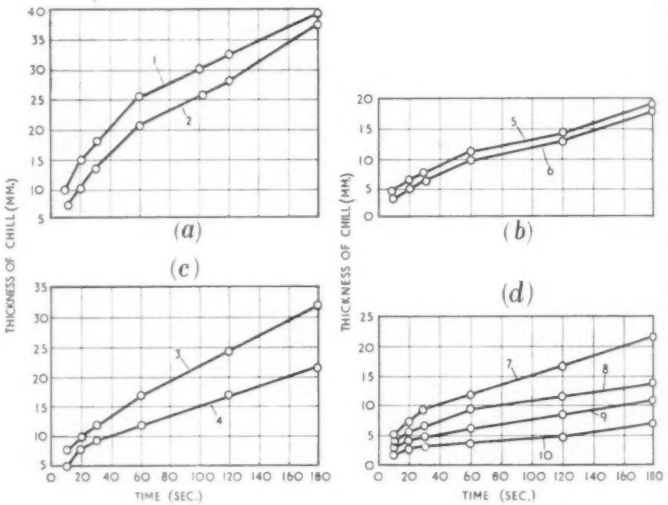


FIG. 2.—*Influence of various moulding materials on the solidification rate of steel. Mould material: (a) Metals—(1) copper alloys and (2) grey iron; (c) high-thermal-conductivity refractory—(3)silicon carbide, and (4) magnesite; (b) sand—(5) green-sand and (6) dry-sand; (d) chamotte-type (heat-insulators)—(7) chamotte with volume/weight 1.2 kg. per cu. dm. (75 lb. per cu. ft.), (8) ditto 0.9 kg. per cu. dm. (56 lb. per cu. ft.), (9) ditto 0.6 kg. per cu. dm. (37 lb. per cu. ft.), and (10) ditto 0.3 kg. per cu. dm. (19 lb. per cu. ft.).*

From the results, it can be seen that it is possible (by the use of such materials) to achieve an even, layer by layer solidification. Copper alloys produce the highest effect (curve 1) and lightweight chamotte of a volume weight of 0.3 kg. per cu. dm. (about 19 lb. per cu. ft.) (curve 10) the lowest chilling action. The ratio of the chilling action of these two substances is 1:6. By the application of such materials, it is possible to equalize a chilling rate of steel sections 60-mm. thick (2.4 in.) which, in practice, is usually sufficient. The influence of various materials on the chilling action in steel and Buntmetall castings is shown in Fig. 3.

Gradation

The quantities of various materials used in procuring directional solidification must be graded so that they ensure an even solidification proceeding towards the feeder-head. The severest chilling action is achieved by metals, especially when used as denseners. For these denseners, copper alloys, grey cast iron and carbon steels can be used. (No significant difference in the action of denseners made of steel or cast iron was noticed in the tests recorded.)

The tests showed that no significant difference exists in the chilling action of magnesite, zircon, chromite and chrome-magnesite. The chilling action, expressed as the dimension (mm.) of the solidified metal layer after 10 to 180 sec. for these materials was 5.25 to 21.3, 5.0 to 23.0, 4.5 to 20.0, and 4.9 to 20.0 respectively. All such materials can be used in the manufacture of non-metallic denseners. The tests using silicon-carbide clearly showed it has a greater chilling action than magnesite (Fig. 2(c)). These two materials have a chilling action lying between that of metals and sand moulds. When using silicon carbide, one obtains steel castings with a smooth clean surface as well as achieving good chilling. However, the high cost and comparative scarcity of silicon carbide force one to seek other materials with approximately the same chilling action, such as cast-iron borings bonded with sodium silicate. The chilling action of green- and dry-sand moulds is roughly identical (Fig. 2(b)). The investigation of the chilling action of various lightweight mould-building chamottes, of a volume/weight of less than 1.0 kg. per cu. dm. (62 lb. per cu. ft.) shows that they chill to a less degree than moulding sand. Heavy chamottes have a greater chilling action, this being clearly connected with the changes in thermal conductivity associated with the volume/weight ratio.

The influence of the volume/weight ratio on the thermal conductivity of chamotte at various temperatures is shown in Fig. 4, drawn from data supplied by the Leningrad Institute on refractory materials (see Table 1).

If, with a decrease in volume/weight ratio from 1.2 to 0.9 kg. per cu. dm. the thermal conductivity

TABLE 1.—*Relationship Between Volume Weight of Chamotte, Thermal Conductivity and Chilling Action.*

Volume/weight of chamotte, kg. per cu. dm.*	Thermal conductivity No. δ kcal./Mh deg. C at 1,000 deg. C.	Depth of solidified metal layer mm. in 10 sec.	Ratio of thermal conductivity No.	Ratio of depth of solidified metal layers.
1.2 (75)	δ_1=0.75	t_1=4.5	δ_1/δ_2=1.25	t_1/t_2=1.3
0.9 (56)	δ_2=0.6	t_2=3.5	δ_2/δ_3=1.37	t_2/t_3=1.4
0.6 (37)	δ_3=0.438	t_3=2.5	δ_3/δ_4=1.7	t_3/t_4=1.6
0.3 (19)	δ_4=0.25	t_4=1.5		

* The figures in parentheses are approximate conversions to lb. per cu. ft.—Editor.

is changed by 25 per cent., then the chilling action is changed by 30 per cent., both values lying fairly closely together. The same applied to the other results given in Table 1. In giving chilling-action figures of various materials according to their thermal conductivity, one must take into account the temperature at which the values were obtained.

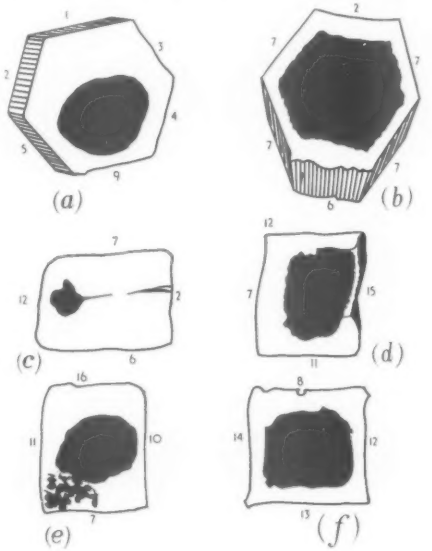


FIG. 3.—*Cross-sections of specimen castings made in composite moulds by a slush-casting technique to determine the chilling action of various materials.*

Key: Specimens (*a*) and (*b*) cast of non-alloyed steel, specimens (*c*), (*d*), (*e*) and (*f*) from alloy "K" 80-3. The mould material tested is shown by the following numbers: (1) Copper-base alloy; (2) cast iron; (3) silicon carbide; (4) magnesite; (5) zircon; (6) cast-iron borings bonded with sodium silicate; (7) moulding sand (green); (8) moulding sand (dry); (9) chamotte with a volume/weight 0.3 kg. per cu. dm. (19 lb. per cu. ft.); (10) ditto 0.4 kg. per cu. dm. (25 lb. per cu. ft.); (11) ditto 0.6 kg. per cu. dm. (37 lb. per cu. ft.); (12) sand/sawdust mixture (sand 75 per cent., sawdust 25 per cent. sodium silicate 10 per cent., the sawdust being dried beforehand); (13) ditto (50 per cent sand, 50 per cent. sawdust); (14) ditto (25 per cent. sand, 75 per cent. sawdust); (15) ditto (25 per cent. sand, 75 per cent. sawdust, 10 per cent. sodium silicate, the sawdust not being dried in this case); (16) hardboard.

The more effective the controlled solidification, the more surely can a casting be obtained without shrinkage and pores. Uniform cooling is desirable to obviate hot-tears and this cannot be achieved through altering the solidification by tilting the mould. Materials, the thermal conductivity of which alters at high temperatures can, however, be utilized. An increase in temperature causes, for example, a decrease in the thermal conductivity of magnesite, whereas the thermal conductivity of chamotte is increased (Fig. 5). The essential difference in the thermal conductivity of chamotte and magnesite enables the initial stages of the solidification of the casting to be controlled. With the progress of solidification in the casting and the heating-up of the mould walls, the difference in the chilling action of the two substances decreases.

This information supplies the conditions neces-

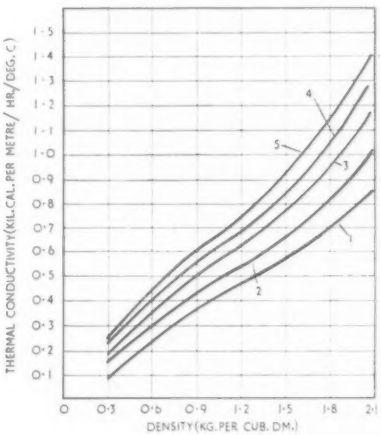


FIG. 4.—*Influence of bulk density on the thermal conductivity of chamotte at various temperatures. (1) At thermal conductivity at 200 deg. C., (2) at 400 deg. C., (3) at 600 deg. C., (4) at 800 deg. C., and (5) at 1,000 deg. C.*

sary for uniform chilling. To summarize, controlled solidification is possible using copper alloys, cast iron, cast-iron borings (or silicon carbide, magnesite, moulding sand or chamottes of volume/weights of 0.9, 0.6, 0.3 kg. per cu. dm. (Fig. 6)). A further decrease of the chilling action can be brought about by the use of various exothermic substances.

Preparation of Materials

The manner of utilization and application of cast metals and magnesite as chills is well known. However, a definite technique can be recommended for the production of cast-iron borings, wood-flour mixtures, light building chamottes and of exothermic materials.

Borings/silicate Mixtures

The cast-iron borings must be ground and passed through a No. 30 sieve. For this material sodium silicate can be used conveniently as a bonding material (this having a number of advantages compared with clay), the mixture then having handling properties that do not differ substantially

Chilling and Heat-insulating Materials

from the usual sodium-silicate-based moulding sands. From 6 to 7 per cent. sodium silicate is added to the borings to obtain an adequate strength. The effect of the addition of sodium silicate on the strength of the test mixture can be assessed quantitively from Fig. 7 (*a*). Chills of all manner of shapes can be made from this mixture. Simply by leaving them in air, the mass acquires a certain strength and after drying out at 200 deg. C., this is adequate for use in mould construction, a further increase of the drying temperature leading to no further improvement in strength (Fig. 7 (*b*)) but the annealing or ignition of the parts made of cast-iron borings is desirable since this lessens their tendency to absorb water. To check this, test-pieces were made and ignited in a muffle furnace at 200 to 1,100 deg. C. After firing, cooling and weighing, the specimens were moulded along with moist-sand mixtures (the humidity of the sand being 7.9 per cent.) and left for varying lengths of time. The amount of moisture absorbed by the specimen was determined by its gain in weight. The influence of the firing temperature on the moisture absorption of the specimens is shown in Fig. 8 (*a*). If such a specimen of the borings/silicate compact be left for 5 hours in a sand mould, the amount of moisture absorbed by it varies by about 0.5 per cent., according to the temperature (curve 7, Fig. 8 (*b*)). The comparison with the hygroscopicity of specimens made of 70 per cent. ground quartz and 30 per cent. clay shows that the moisture absorption of the latter is considerably higher than that of the mixtures containing sodium silicate.

A marked influence of the firing temperature on the moisture absorption is also to be seen in Fig. 8 (*b*). If, for example, the specimen is kept for 4.5 hours in sand with only 5.76 per cent. moisture and the ignition temperature is changed from 700 to 1,100 deg. C., the difference in moisture absorption is 2 per cent. (curve 4, Fig. 8 (*a*)), *i.e.*, it is considerably greater than for mixtures containing sodium silicate.

The relative chilling action of cast-iron borings and sodium silicate compacts was shown by breaking the cast specimen (Fig. 3 (*b*)), indicating that it is about 1.5 to 1.6 times greater than that of moulding sand.

Lightweight Chamottes, etc.

The production of shapes made of light chamotte is quite well known. Light chamottes have been little used as moulding material up to now despite the fact that their use as a lining material for feeder-heads and for the production of iron castings

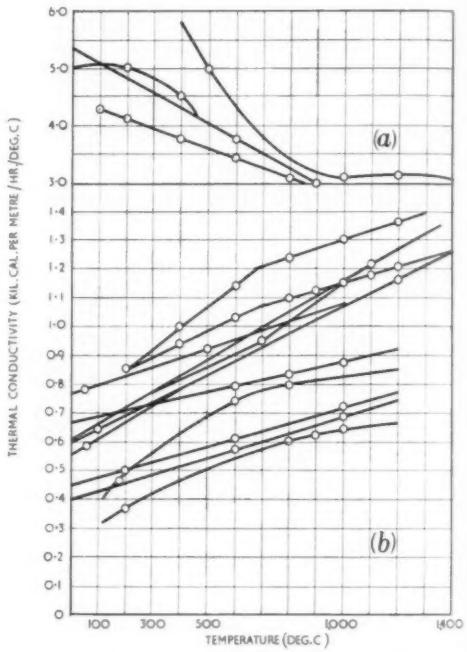


FIG. 5.—*Influence of temperature on changes of thermal conductivity of* (*a*) *magnesite and* (*b*) *chamotte.* (*According to values of various investigators.*)

shows considerable promise. The method of production of lightweight building materials and their volume/weight ratios are given as:—

Volume/weight Ratio: Kg. per cu. dm.	lb. per cu. ft.	*Production Process:*
0.85 to 1.05	— 53 to 65	Burning-out process.
0.56 to 0.85	— 35 to 53	Chemically-produced material.
0.50 to 0.30	— 31 to 19	Foamed material.

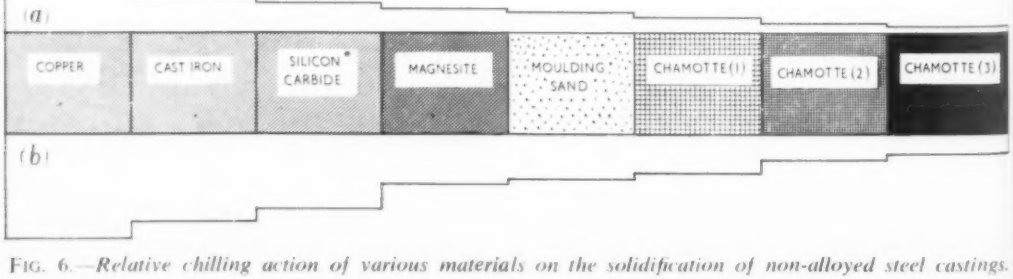


FIG. 6.—*Relative chilling action of various materials on the solidification of non-alloyed steel castings.*

The densest of the lightweight mould material is made with ignitable components such as wood-sawdust or powdered coal. Tests of lightweight chamottes show that not only the porosity of the material (the volume/weight ratio), but also the size of the pores influences the thermal conductivity, at a given volume/weight ratio. The mesh size of the ignitable components is therefore of great importance.

Experience of the manufacture of shapes from

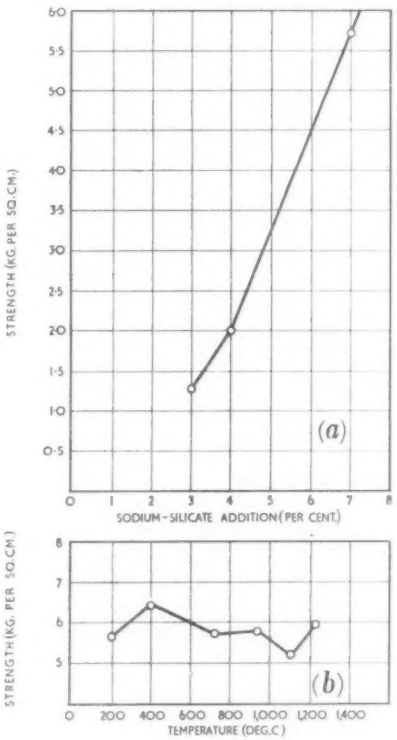


FIG. 7.—*Influence of sodium silicate content and firing temperature on the strength of compacts of cast-iron borings.*

sawdust/sand mixtures show that the amount of the former ingredient should be 25 to 30 per cent. An increased amount of sawdust decreases the mouldability, without noticeably lowering the specific weight. Dry sands containing sawdust shrink by 11 to 13 per cent., but the shrinkage can be reduced to 8 per cent. by the use of a lightweight chamotte instead of a dense one. Lightweight chamotte must be fired at high temperatures (1,350 to 1,400 deg. C.) which is not feasible in foundries. Chamotte fired at lower temperature has lower mechanical properties, is very hygroscopic, and is therefore unsuitable for moulding purposes. The centralized production of moulding material made of lightweight chamotte of various kinds for use in several foundries in a group is hardly a workable proposition, but an exception is the making of sleeves for closed feeder-heads and moulded shapes for ingate systems, etc.

Sawdust/Silicate Mixtures

Foundry practice requires the following properties for mould materials of the type under consideration: (1) Volume/weight ratios not greater

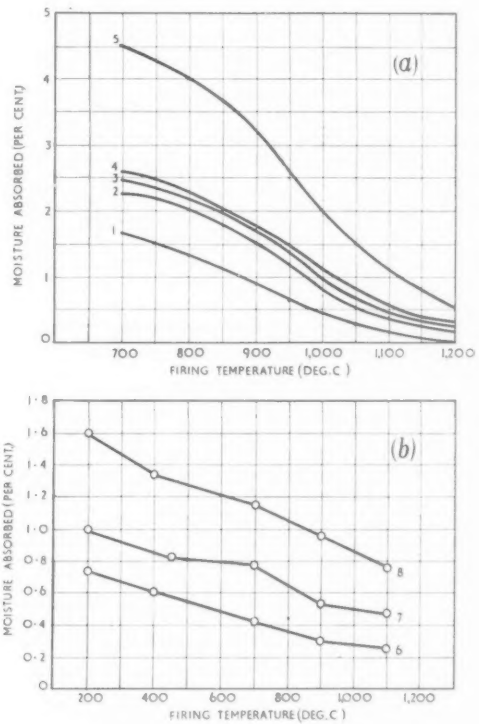


FIG. 8.—*Influence of firing temperature on changes in hygroscopicity of specimen of cast-iron borings bonded with sodium silicate and specimens of sand (Marschallit) and clay.*

Key: (*a*) Specimens of sand (Marschallit) and clay, moulding-sand moisture 5.8 per cent: (1) after one hour in the sand mould, (2) after three hours in the sand mould, (3) after 4.5 hours in the sand mould, (4) after 6 hours in the sand mould, and (5) after 16 hours in the sand mould. (*b*) Specimens of cast-iron borings, moulding-sand moisture 7.9 per cent: (6) after 1 hour in the sand mould, (7) after 5 hours in the sand mould, and (8) after 18 hours in the sand mould.

than 0.9 kg. per cu. dm.; (2) good mechanical properties; (3) low hygroscopicity, and (4) the production of the various moulds must respond to the foundry technique and demand no special equipment. To obtain a material that fulfils all these conditions, tests were carried out with mould components of sand/sawdust mixtures bonded with

sodium silicate. By using sodium silicate as a bonding material instead of clay, it was possible to lower the firing temperature from 1,350/1,400 deg. C. to 700/720 deg. C.—a figure which is attainable in foundries. The tests so far carried out with mixtures bonded by sodium silicate show a lower hygroscopicity compared with chamotte/clay mixtures (see Table 2 and data quoted in illustrations). These tests were carried out with quartz sand (K50/100-type) and sieved sawdust (sieve No. 50) in co-operation with Mr. M. T. Bogdanow. The bonding material was sodium silicate (specific gravity 1.3) up to 10 per cent., the mixture being fired in a muffle furnace at 700 deg. C. As a result of these tests, the influence of the addition of sawdust on the bulk density, the shrinkage, and the chilling action was determined and the hygroscopicity of the material was investigated. The results are shown in Fig. 9.

The marked increase of the shrinkage, which was connected with an increase in sawdust content, is obvious (Fig. 9, curve 5). The shrinkage of a sand/sawdust mixture, bonded with sodium silicate, however, is smaller than that of a chamotte/sawdust mixture. The volume/weight ratio of the mixture after firing decreases with the increase in sawdust content of the original material (Fig. 9, curve 4). Despite this, the large shrinkage does not permit the lowering of the volume/weight ratio by the addition of sawdust. The volume/weight ratio can, nevertheless, be smaller than that of lightweight chamotte with combustible components. The production of chamotte from sawdust/sand mixtures by the burning-out method gives a volume/weight ratio of over 1.0 to 0.85 kg. per cu. dm. The influence of the amount of sawdust in the mixture on the chilling action is given by curve 3, Fig. 9 (for the alloys "K" 80-3). An increase in the sawdust content of the mixture increases the hygroscopy somewhat (curves 1 and 2); the absolute moisture of the mixture is considerably less than the amount of moisture absorbed by chamotte of equal porosity at the same firing temperature.

The mechanical strength of the specimen depends on the quality and quantity of sodium silicate. Breaking strength of 5 to 6 kg. per sq. cm. (70 to 85 lb. per sq. in.) were obtained for the grade quoted, this being quite sufficient for practical purposes. On the basis of the properties given, one can use sand/sawdust mixtures bonded with sodium silicate instead of chamotte containing combustible components, but only where a single casting is being produced.

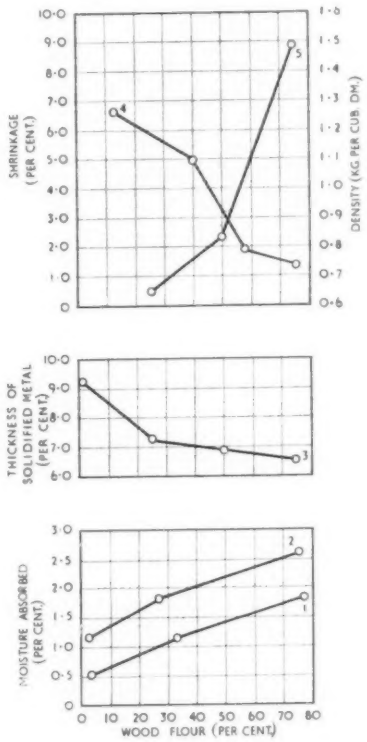


FIG. 9.—*Influence of the amount of sawdust (wood flour) in the mixture used on its properties after firing at 700 deg. C.* (1) *and* (2) *Influence on the hygroscopicity, after keeping the specimen in the mould with a moisture content of 7.0 per cent. for 3.5 hours, and* (2) *ditto after 22 hours;* (3) *influence on the chilling effect,* (4) *influence on the bulk density and* (5) *influence on the amount of shrinkage.*

TABLE 2.—*Water-absorption Capacity of Various Moulding Materials.*

Nature of test.	Composition.	Weight before experiment, per cent.	Weight after experiment, per cent.	Gain in weight, per cent.	Average gain in weight, per cent.	Remarks.
Core half built into mould, test time 12 hours	70 per cent. Chamotte 30 per cent china clay	24.4 25.03	25.58 26.29	4.6 5.3	4.8	Moisture content of mould, 5.5 per cent.
Exposure to air 12 hours ..	Ibid	23.00 24.45	23.07 24.52	0.3 0.24	0.27	In the laboratory.
Core half built into mould ..	Quartz flour + 7 per cent. sodium silicate	25.55 26.03	25.62 26.09	0.27	0.25	Moisture content of mould, 5.5 per cent.
Exposure to air 12 hours ..	Ibid	23.83 25.23	23.84 25.24	0.042 0.04	0.041	In the laboratory.

Heat-insulating Materials

Separate heat-insulating mould-units, *e.g.* sleeves for feeder heads, can most suitably be made from lightweight chamotte, with the addition of coal-dust. Such mixtures of moulding sand have nearly the same volume/weight as chamotte/sawdust mixtures, due to very small pores; the thermal-conductivity value for the same volume/weight ratio is intricate moulds, but one must be able to control the preparation quite closely.

The production of this sort of lightweight building material is known to rely on the fact that in quickly-solidifying masses, pore formation is due to escaping gases, these being formed by the decomposition of carbonic salts. The raw materials (chamotte, clay and sand) are mixed in a dry state

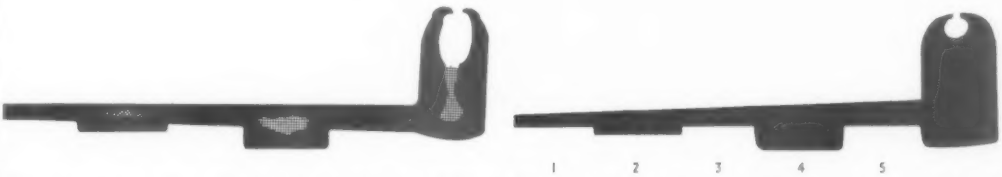


FIG. 10.—*Representation of a casting embodying different thickness, cast with only one feeder-head; left-hand casting made in sand, and that on the right in a mould of various materials.*

Key: (1) greensand, (2) cast-iron borings, (3) chamotte of volume/weight 0.6 kg. per cu. dm., (4) cast iron, (5) sand/sawdust mixture, based on sodium silicate (without burning out of the sawdust).

somewhat smaller. The following composition was used in the Author's experiments: heat-resisting clay 50 per cent., powdered chamotte 15 per cent., sawdust 5 per cent., and coal-dust 30 per cent. (This mixture is used in the Leningrad works, Lense, for heat-insulating sleeves of closed-top feeder-heads, which work under gas pressure.) A small addition of sawdust helps to complete combustion of the coal-dust. Moulds of these sand mixtures, for example chamotte/sawdust sands, must be baked at high temperatures.

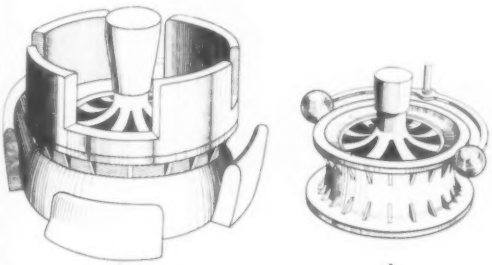


FIG. 11.—*Comparison of moulding methods applied to a large flanged cylinder: (a) original method employing open feeder-heads and heat-insulating padding between the flanges, (b) same casting produced with pressure feeding, equivalent to a 6-ft. head, and using ribs between the flanges which are subsequently removed.*

Chemically-produced Material

Mould materials with a volume/weight ratio below 0.75 kg. per cu. dm. (47 lb. per cu. ft.) are made in the same way as chemically produced lightweight building materials. For tests to determine the chilling action of such material, bricks of this type were used, from which the moulds' parts were cut. This type of material can be used for with carbonates (chalk, limestone or dolomite) and with stabilizers (gypsum demi-hydrate ($CaSO_4 2H_2O$) type of quick-setting cement). This is quickly mixed with acidified water, the resulting slip being poured into moulds. The gases evolved approximately double the volume and the mass solidifies in a partially gas-filled condition. The volume/weight ratio of the product made by this process depends on the relative rapidity of the gas evolution and the action of the stabilizers. These two conditions depend in their turn on the particle size of the material, the concentration and quantity of acid, the temperature, the kind of carbonate used, etc. For example, a volume/weight ratio of lightweight building material of 0.6 kg. per cu. dm. (37 lb. per cu. ft.) can be obtained by using a mixture of 100 parts clay, 14 parts gypsum and 4 per cent. sulphuric acid at 80 per cent. dilution. Such an insulating body has a large shrinkage and requires careful drying and firing.

Foamed Material

To obtain lightweight building materials of an even smaller volume/weight ratio, the foam process is used, though this is less suitable for adoption to the production of moulds. These lightweight building materials are made by mixing a clay suspension with foam. For example, a foam of the following composition can be used: 50 per cent. resin soap and 50 per cent. strong glue (used powdered). Alum ($K_2SO_4/Al_2(SO_4)_3.24\ H_2O$) was used to bond the foam, which is added to the slip. The bricks thus produced are irregular in shape and must be finished. With special machines and apparatus for the production of high-quality slip and foam, it is possible to produce building materials of volume/weight ratio of only 0.3 kg. per cu. dm. (19 lb. per cu. ft.), which, as already mentioned, have a low chilling action. The method of production of mould parts of such material is not at present sufficiently well developed and further tests need to be made. For the heat insulation of

Chilling and Heat-insulating Materials

the straight portions and simply-shaped parts of gating systems, bricks can be used or profiles shaped to the required dimensions.

Exothermic Materials

Mixtures with the addition of sawdust and coal-dust, not previously burnt out, and mixtures with Thermit can be used for the heat insulation of individual parts of a mould. The testing of the chilling action of a sand/sawdust mixture consisting of 75 per cent. sawdust, 25 per cent. sand, and 10 per cent. sodium-silicate (specific gravity 1.3) shows it has a smaller action than light-weight building materials with a bulk density of 0.3 kg. per cu. dm. This, it is explained, not only results from the heat-insulating properties of the sawdust but also from the heat developed during their ignition. Observations taken during casting demonstrate the burning of such mixtures. In order to prevent the absorption by the liquid metal of gases resulting from the ignition, parts of the mould made from this material must be covered with less-gas-producing mixtures, such as ground quartz with an addition of 2 to 3 per cent. sodium silicate.

The influence of the addition of Thermit to the mixtures for such mould parts has not been accurately tested and only a few results exist as to the positive action of Thermit. Experiments carried out by the Leningrad Institute show that a mixture of 8 parts clay, 92 parts sand, 30 parts Thermit (24 per cent. aluminium powder plus 76 per cent. mill-scale) has a heating effect, which can be established by comparing the feeder-head cavity formed. In covering the feeder-head with a moulding-sand mixture without Thermit, the head cavity was elongated; if covered with a mixture containing Thermit, it was concentrated, showing a later solidification of the upper part of the feeder-head. Tests carried out by the Kownoer Dredger works also showed a favourable action with Thermit.

Success depends on the ignition temperature of the Thermit, which must not be higher than the temperature of the contact surface between the mould and the liquid steel, and also on the oxidation of the aluminium powder only at the proper time. This oxidation can occur disadvantageously either during storage or when first incorporated in the moulding mixture.

An example of results secured from moulding materials with different chilling effects is shown in Fig. 10. In this case, the feeding of the thick section of the casting proceeded through the thin cross-section from the single feeder-head. When casting a stepped wedge in sand having a feeder-head only at one end (left-hand diagram), a cavity in the thickened section is unavoidable. If, however, different moulding materials are used for the chilling of thick cross-sections, and insulation of thin sections, so that despite different wall-thicknesses in a casting, the solidification is graduated towards the feeder-head, one can obtain a perfect casting (right-hand diagram). This example shows that by the use of various moulding materials, sections of varying wall-thickness can be fed with metal from one feeder-head.

Large Castings

In castings of large dimensions, the effective range of a feeder-head may make success doubtful. As is shown by tests carried out at the Leningrad Bolschevik works, this difficulty can be overcome by the use of compressed air (Fig. 11), which increases the effective range of the feeder-head up to

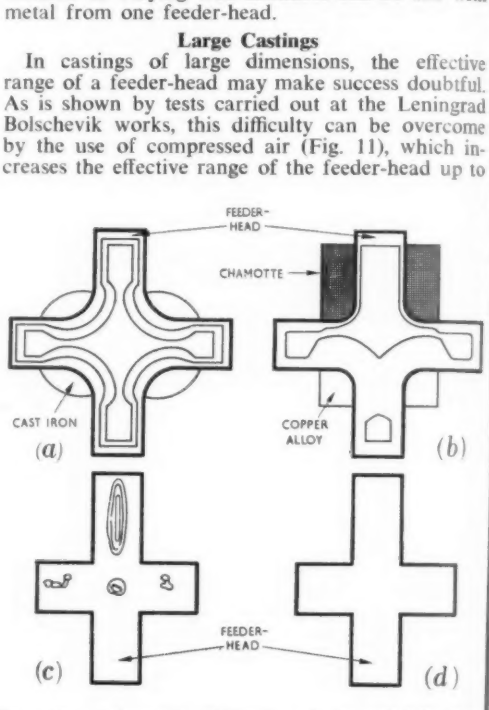


FIG. 12.—*Schematic diagrams of the solidification of a casting in the shape of a Maltese cross: (a) with the exclusive use of metallic chills; (b) with the employment of heat-insulating and cooling moulding materials. Sketches (c) and (d) represent radiographs of the solidification secured according to methods (a) and (b).*

6 ft. (Fig. 11 (*b*)). The moulding technique employed previously is shown in Fig. 11 (*a*), using open feeders and a massive upper flange, both flanges being connected by a thin wall. In the casting of such items (in the Leningrad Bolschevik works) with heads under compressed-air pressure, casting "ribs" were sited between both flanges (ribs omitted from the diagram), through which by means of two small side-heads the bottom flange could be fed.

If neither the use of ribs nor the use of compressed air produce a dense casting in the bottom section, heat-insulating moulding material can be applied to replace the ribs, the use of higher pressures in the feeder-head still being necessary.

According to American research workers, it has not been possible up to now, to cast a perfectly-sound casting in the form of a Maltese cross. They therefore recommend that such forms be avoided in the design of castings. The work of the present

author, however, in co-operation with Professor J. A. Nechendsi has shown that such cross-pieces can be cast without defects (Fig. 12).

If only metallic chills are used for such designs, as in the USA, faults can and do occur. One can recognize that in the places where the metallic chills are in position, solidification was more rapid than in the area of contact of the casting and the ordinary mould (Fig. 12(a)). The axial zone and the three arms of the cross are cut off from the feed of steel and cavities must therefore be formed in the centre and the arms, no matter what the dimensions of the chills are. The X-ray picture of the cross (shown diagrammatically in Fig. 12 (c)) confirms this. By the use of heat-insulating moulding materials one can achieve a solidification directed towards the feeder-head and by using chills of the correct size, a sound casting is produced as in Fig. 12(b); Fig. 12(d) illustrates the X-ray picture of a cross made in this way.

Further Research Needed

Further research in the field of chills and insulating materials must be carried out in the following ways: (*a*) wider trials and practical use should be made of heat-insulating sleeves for feeder-heads (and those that respond specially to the application of artificial pressure), in the first instance for alloy steels and Buntmetall; (*b*) the establishment of a working specification for riser sleeves; their centralized production in special works and their application to non-alloyed steels; (*c*) the introduction of moulding materials with varying chilling action as substitutes for normally used materials; (*d*) discovery and testing of new chilling and heat-insulating materials; (*e*) further testing and use of exothermic mixtures; (*f*) the use of cooling and heat-insulating mould materials in casting in permanent moulds, and (*g*) the application of heat-insulating materials at ingates.

Weld Rectification of Gunmetal Castings* (Abstract)

By L. A. Depue and W. A. Pennington

The purpose of the work described in this paper was to develop an arc-welding technique which would prove practical for repairing gunmetal castings. The alloy, which contains Cu 86 to 89, Sn 7.5 to 9.0 and Zn 3.0 to 5.0 per cent., is highly resistant to sea-water corrosion. One of the serious obstacles to the making of good welds on gunmetal is the high conductivity of the alloy. Another disadvantage stems from the high zinc-content.

Weld tests using commercial aluminium-bronze and phosphor-bronze electrodes for arc welding indicated that, although welds of good surface-appearance can be produced, the deposits contain numerous inclusions derived from non-metallic coatings and skilled welders could not lay down welds which were free of this defect. The high thermal-conductivity of gunmetal permits the deposited metal to remain in the molten state for only a few seconds and thus it is not possible to prevent entrapment of the flux-coating material by giving time for it to float up and out of the weld deposit.

In further trials, uncoated phosphor-bronze electrodes were developed, primarily to eliminate the entrapment of coating materials in the weld deposit. Preliminary welding with cast, uncoated electrodes was carried out in a gas-tight enclosure in atmospheres of carbon-dioxide, argon and nitrogen, and later in air, the $\frac{1}{8}$-in. dia. bronze electrodes being in the cast form and containing about Cu 89.5, Sn 10 and P 0.03 to 0.5 per cent. Welds produced in nitrogen were found to be strengthened by increasing the phosphorus content in the electrodes and the average maximum tensile strength across such welds was 14.7 tons per sq. in., obtained from electrodes containing 0.41 to 0.45 per cent. P.

Welding in air resulted in an increase to an average value of 18.5 tons per sq. in. tensile, 10.8 per sq. in. yield strength, and 21 per cent. elongation (US standards). Spectrographic analysis indicates that 0.5 to 0.7 per cent. Zn enters the weld bead from the base metal. For best welds on gunmetal, an electrode containing Cu 90, Sn 10 with 0.30 to 0.45 per cent. P is recommended. Variations in tin content to as low as 6 per cent. do not appear to disturb the action of the electrode and small amounts of relatively non-volatile elements such as nickel are not harmful.

Practical Applications

Defective castings of gunmetal and similar alloys were welded in air with uncoated, high-phosphorus electrodes of the type described. Coldshuts, misruns and small tears were easily repaired on a variety of cast shapes. Shrink holes and porosity presented greater problems because zinc vaporization—greatly increased in porous areas—caused poor deposits where the arc was first struck. Subsequent chipping of these areas and rewelding by directing the arc on metal previously deposited produced uniformly good repairs. Repair of extensive porosity in the castings was not attempted.

For repairing porosity or other defects which run deeper than $\frac{1}{2}$ in., the area should be chipped out in the form of a U-joint. Surface defects less than $\frac{1}{2}$-in. deep can often be welded without first preparing a special joint. The electrode, however, will deposit metal best into a U-joint. The restraining action of the casting on contraction of the deposited metal usually results in weld cracking unless the whole mass is preheated from 260 to 425 deg. C. Weld beads should also be deposited rapidly, so that a minimum amount of molten metal is maintained under the arc.

* Abstract of paper published in *Metal Progress*. Of the Authors, Mr. Depue is metallurgical consultant, US Naval Research Laboratory, Washington DC, and Professor Pennington is head of metallurgy, University of Maryland, College Park, Maryland.

Publications Received

Bulletin 140. Published by the British Employers' Confederation, 36, Smith Square, London, S.W.1.

This issue of the *Bulletin* carries as a supplement the Report by the Confederation's industrial education and training committee—to be submitted to the Ministry of Education—on "Education between the ages of 15 and 18."

The Confederation is a body which unites the wage-negotiating employers' associations, and it is the member associations which make agreements with the trade unions as to the training to be given to apprentices and young people. Thus, the views expressed in this report are of outstanding importance, since the recommendations evolved by the general run of trade associations on the subject of education and training can only be implemented by the wage and work-conditions negotiating bodies. Therefore, those interested in this subject are counselled to procure a copy of the supplement.

The main points of the Report, which deals with the Crowther Committee findings, are that the Confederation's committee supports the raising of the school-leaving age, as current entrants to industry are largely insufficiently versed in mathematics and English. The Report has reservations to make in reference to the proposed leaving age by suggesting that it should include an extra year, either at school or in a technical college. The committee supports the recommendation that there should be two leaving dates a year—at Easter and in the summer. A less-specialized education is suggested for the grammar schools, which normally have been geared to the entrance examinations for the universities; bias in school curricula towards industry and commerce is suggested for those not entertaining an academic career, using the National Certificate and City and Guilds examinations as a suitable basis.

Research for Industry, 1959. Report on work done by research associations in the Government scheme. Published for the Department of Scientific and Industrial Research by Her Majesty's Stationery Office, York House, Kingsway, London, W.C.2; price 8s. net.

It is interesting to conjecture how much the lay reader would understand the various statements made in this Report on the "scope of the present work," being undertaken by the various research associations. The reports of the metallurgical associations make ordinary reading for the reviewer, but due to lack of technical knowledge of the respective subjects he found a few of the others difficult to understand. The foundry research organizations for both cast-iron and steel castings are accorded special publicity, together with ten others out of the 50 sponsored associations under the heading "Review of Achievements." These were the ones which came up for grant renewal last year. The foundry industry directly benefits from the joint incomes received through DSIR and from members—by the British Cast Iron Research Association (£197,000) and the British Steel Castings Research Association (£94,000), whilst a part of the work of the British Non-Ferrous Metals Research Association and the British Coke Research Association is of direct interest to founders. The report discloses that the last named Association is presided over by Sir Frederick Scopes and that one of the "visitors" is Mr. S. H. Russell.

Good news is divulged in a paragraph covering creep research. It was probably started by the late Mr. J. H. S. Dickinson at the River Don Works in Sheffield and since then an enormous amount of work has been done by national research and industrial research associations and by private firms. Now the National Engineering Laboratory has created a "creep information centre" to assemble data and co-ordinate future work. This should be most valuable.

Finnish Trade Review. Published in connection with the Finnish Industries Fair by the Finnish Foreign Trade Association, E. Esplanaadikatu 18, Helsinki, Finland.

In this well-produced magazine the Finnish Foreign Trade Association efficiently accomplishes its task of giving a description of the progress made by Finnish industry. Emphasis is given in the book to the fact that Finnish manufacturers pay particular attention to design, and where appropriate, the names are given of the designers of the various articles illustrated. This system could well be followed by British firms. For instance, a frying pan would probably sell better if a card placed at its side informed the buyer that it was designed by so and so, especially if the name becomes recognized in the field. A few British firms have already found this method successful.

Guide to Resins and Glues for Industries. Published by Leicester, Lovell and Company, Limited, North Baddesley, Southampton.

This 16-page booklet covers a wide range of industries in which resins and glues are used. Two pages are devoted to foundry and patternmaking applications. The company's Thor resins are used in corebinding, sand pre-coating and in shell moulding, whilst Epophen is the name applied to the firm's material for pattern and corebox production. The applications of each of these materials are described in some detail, precautions are quoted and potentialities indicated.

Hardenability of Carburized Steels. Published by the Climax Molybdenum Company, and obtainable through the Climax Molybdenum Company of Europe, Limited, 2, Cavendish Place, London, W.1.

This 136-page well-illustrated brochure is of American origin and so references are made throughout to US specifications and temperatures are recorded in the Fahrenheit scale. Yet the numerous graphs and the massive technical data it contains must make it extremely valuable to metallurgists concerned with heat-treatment problems.

The Case for Coal. Published by the National Coal Board, Hobart House, London, S.W.1.

This well-produced brochure makes interesting reading and it is good to learn from it that a real attempt is now being made by the National Coal Board to conform to the old business adage "the customer is always right," and that there is a desire to give the customer what he wants at the right time and place. The brochure rightly stresses that coal as a fuel has many potentialities, when correctly burnt in a modern plant, and, moreover, it is one of the very few natural resources of the UK.

AN ORDER WORTH £80,000 for multi-zone, fully air-circulated radiant-tube soaking pits has been placed with Stordy Engineering, Limited, Wolverhampton, by James Booth Aluminium, Limited, for installation in their Kitts Green Works, Birmingham. The pits are to be used in conjunction with the new hot reversing mill—said to be the largest of its type in Western Europe—which James Booth will be installing in the second half of 1961.

SECTION DEVOTED TO THE TECHNOLOGY OF PRODUCING DIMENSIONALLY-ACCURATE CASTINGS

European Investment Casters' Conference

The seventh event of its type, the Conference held in Liège in July attracted 70 delegates from 10 countries. Representatives from UK investment foundries were prominent both in contributing papers and in the discussions which took place on a wide range of topics. What follows is a general account of the proceedings, contributed by the JOURNAL'S own representative who attended the Conference.

The European Investment Casters' Conference which was held at the Palais des Congrès, Liège, from July 3 to 6, was the seventh gathering of the same type within the loose framework of this informal association. Under the presidency of Mr. H. J. Meerkamp van Embden of N. V. Philips, Eindhoven, the Conference had been organized by Mr. Pierre Mathy (of S.A. Usines Gilson, La Croyere) and was attended by about 70 representatives from 10 countries.

Programme

The programme opened with an informal reception at the Palais on Sunday evening, July 3, and this was followed on the Monday morning by addresses of welcome by the president and by Professor J. Léonard, a past-president of the *Association Technique des Industries de la Fonderie Belgique*, and of the International Committee of Foundry Technical Associations. He traced the historical association of Liège with the foundry and metallurgical industries of Belgium, and the similarity and differences between the technical problems confronting the conventional foundry industry and investment founders.

The remainder of Monday, July 4, the whole of Tuesday, and the Wednesday morning were devoted to the presentation and discussion of the technical papers, to which reference is made in what follows, and to the holding of the castings competition, which has become a regular feature of these international meetings.

Castings Competition

On this occasion the castings competition attracted a particularly impressive entry of 54 castings submitted by 20 different companies. Voting among the delegates themselves awarded the diploma for the best casting of the year to the Werkspoor concern, of Amsterdam, in respect of a turbine-wheel casting. Second place in this section was won by Philips, Eindhoven, for a group of castings used in X-ray machines. The winning entry in the section of the competition which was judged from the point of view of assessing the casting which best portrayed the potential development of the investment process, was subsequently withdrawn, but the second place in this section was won by the British firm of P.I. Castings (Altrincham), Limited, who exhibited an artificial arm joint-assembly, comprising five castings.

Banquet

The diplomas won in the castings competition were presented to the winners at the annual banquet held at "Le Clou doré" restaurant during the evening of Tuesday, July 5, when the president was supported at the top table by Mrs. Meerkamp van Embden; Mr. and Mrs. R. W. N. Danielsen (Deritend Precision Castings, Limited); Mr. K. A. Krekeler (Gebr. Böhler A.G.); Mr. E. Hengler (Stahlwerk Carp & Hones K.G.); Mr. B. J. Helders (N.V. "Industrie")—honorary treasurer of the conference; Mr. M. Allard (Microfusion, Paris); Mr. H. Straehl (A.G. Gebr. Sulzer); Mr. G. Ohlin (A.B. Kanthal, Sweden); Mr. Roger F. Waindle (Waimet Alloys Inc., U.S.A.), and Mr. J. Bolton (British Investment Casters' Technical Association). The informality and enjoyment of the evening was assisted not only by the absence of after-dinner speeches, but by a request from the president towards the conclusion of the meal that guests seated at evenly numbered places should move two places to the right and that the remainder should move two places to the left—a move which led to the formation of an increased number of friendly contacts between delegates. The Conference concluded on the Wednesday afternoon, July 6, with a visit to the works of Societé Espérance, at Longdoz, near Liège. Ladies attending the Conference enjoyed a full programme of sightseeing, including a visit to one of Liège's famous glass works. (During the earlier proceedings, it was decided that the next conference will be held at Florence in September, 1961.)

TECHNICAL PAPERS

Some of the papers read to the Conference embodied only tentative conclusions by the authors and the texts are not being generally released. Proceedings will, however, be published by the organization in due course and will be obtainable from Mr. Meerkamp van Embden, at N.V. Philips Gloeilampenfabriken, Eindhoven, Holland. In the

European Investment Casters' Conference

meantime, the following summaries have been provided:

Specifications for the Investment Casting Industry in the United Kingdom

By L. S. Taylor (G. L. Willan, Limited) and A. G. Mason (Deritend Precision Castings, Limited)

After first discussing the background to the specification problem as it affects investment founders, the Authors proceeded to examine the logical development of specifications, first in relation to other steel castings and then in the particular field of investment products. Reference was also made to work in progress in the non-ferrous field and some idea was given of what the future may offer. (The full text of this paper appeared in the JOURNAL of August 4, 1960.)

Alloy Specifications for German Investment Casters

By K. A. Krekeler (Gebr. Bohler A. G.)

This paper represented a continuation of that presented at the 1959 Conference by Dr. E. G. Nickel* and summarized further work completed or in hand by the investment-casting technical committee of the *Verein Deutche Giessereifachleute* in preparation for the issue of German standard specifications for investment-cast ferrous-alloys. Data are being obtained on the mechanical properties of the compositions referred to in Dr. Nickel's paper and the variations obtained as a consequence of changes in casting technique and heat-treatment.

Effect of Composition and Heat-treatment on the Impact Resistance of Some Plain-carbon, Investment-cast Steels

By P. Mathy (Usines Gilson)

Mr. Mathy reported that investment founders in France, Holland, Italy, Spain, Belgium and Germany had, since the last conference, collaborated in the production of impact-test data on plain-carbon steels, in which controlled compositional variations had been made—and which had been subjected to different thermal treatments including normalizing, quenching, tempering, martempering and austenitizing. However, the data submitted by the co-operating organizations had not been received sufficiently far in advance of the conference to permit of a full analysis being made; but Mr. Mathy indicated the types of correlation that he hoped to derive from this programme. He said the primary aim of the exercise had been achieved in that it had been shown that it was possible to conduct a co-operative investigation on an international basis and he expressed the hope that further such programmes would be carried out in the future.

* See FOUNDRY TRADE JOURNAL, September 3, 1959, pp. 109-110.

Multipoint Immersion Pyrometer with Temperature Recorder

By F. Faus (Aifa S. A., Spain)

The Author described an installation recently completed at his foundry and indicated the advantages which had been obtained from improved control of melting and casting temperatures.

Influence of Casting Methods on the Properties of High-temperature Alloys

By Dr. W. Tofaute (Fried. Krupp Widia-Fabrik)

(In the absence of the author through illness, the paper was presented by Mr. V. Gravenhorst.) Tentative conclusions were presented from an investigation made on three materials of the following percentage compositions (*a*) Cr 25, Ni 8, W 10, and Co balance; (*b*) Cr 20, Co 20, Ti 2, Al 6, and Ni balance; (*c*) Cr 15, Mo 5, Ni 2, Al 6, and Ni balance.

Informal photographs taken during the Liège meeting of the European Investment Casters. Top: Group at one of the technical sessions (two using the simultaneous translation service, via earphones) from left to right, Mr. K. A. Krekeler (Germany), Mr. J. Bolton (England) and Mr. J. Léonard (Belgium). Below is shown a section of the banquet gathering, with (left) Mr. B. J. Helders (Netherlands), treasurer of the EICC, and Mr. Meerkamp van Embden the president (right) talking to Mr. Bolton.

The investigation had been made to determine (*a*) the dependence of hardness and other room-temperature properties on the casting and mould temperatures; (*b*) the influence on mechanical properties of test-bar section; (*c*) the effect of grain-size on mechanical properties; and (*d*) the relative flowability of the three alloys. On the effect of test-bar section, the Author reported a decrease of 25 per cent. in mechanical properties with increase of bar diameter from 3 to 10 mm. ($\frac{1}{8}$ to $\frac{3}{8}$ in.). The flowability determinations were made using a test mould developed in the Friburg School of Mines in which a group of bars ranging in section from one to 10 mm. dia. are connected to a common runner-system and the flowability property is assessed by measuring the length of bar of given diameter which is successfully cast. Of the three alloys examined, the nickel-base materials exhibited flowability values which were superior to the cobalt-base alloy.

Investment Casting in America, 1960

By R. F. Waindle

The paper was divided into six main sections: (*a*) production statistics; (*b*) the Investment Castings Institute; (*c*) alloy development; (*d*) vacuum melting; (*e*) forged *versus* cast turbine blades; and (*f*) the automobile gas-turbine. Mr. Waindle said that current information showed that there was an increase in the proportion of the total trade represented by miscellaneous commercial investment castings, and a corresponding decrease represented by turbine-blades and -vanes. Taking 1957 production at 100 per cent., 1958 output had been only 40 per cent., and 1959, 70 per cent. It was believed that current output was again approaching the 1957 level. In 1959, 60 per cent. of the business done represented repeat orders, 25 per cent. was new sales to existing customers, and 15 per cent. was new business. There had been a growth in non-ferrous business: it now represented 23 per cent. of all commercial castings and 10 per cent. of the total output, including blades.

Alloy Development

Speaking of alloy development, Mr. Waindle said there was a growing interest in precipitation-hardening stainless steels of the 17-4PH and AM-355 types; but their use was being approached with caution. The development of so-called super-alloys was proceeding to meet turbine designers' specifications in which gas-inlet temperatures of 1,100 deg. C., and working temperatures of 1,000 deg. C. were quoted. In the developments, control of sulphur content had been shown to be extremely critical. Generally speaking, these materials were about three times the price of nickel-base alloys.

Interest and experience in vacuum melting and castings was continuing to grow in the USA with some preference, Mr. Waindle thought, for the consumable-electrode and electron-beam types of furnace: three 250 kw.-capacity furnaces of the latter type had recently been installed by one company.

There had recently been a gratifying improvement in confidence in cast as opposed to forged turbine-vanes. This had been partly brought about by the loss in forgeability consequent on development of the high-strength alloys. It had however been established that castings yielded higher service-properties than forgings, in both stator and rotor vanes.

Forecasts of the commercial development of the automobile gas-turbine engine suggest that 75 per cent. of the total engine production in the USA would be of this type by 1975: this represented an attractive prospect for the investment founder.

Influence of Test-bar Design on the Mechanical Properties of Two Cast High-temperature Alloys

By R. M. Cook and P. J. Penrice (Mond Nickel Company, Limited)

In this research, Nimocast "90" alloy was air-cast and argon-cast, and vacuum-melted Nimocast "713C" was vacuum-cast and argon-cast into five differently-designed test-bars. In general, the best mechanical properties were exhibited by a vertically-cast, tapered bar. The investigation also demonstrated the superiority of argon-cast Nimocast "90" as compared with air-cast material.

Metallurgical Patents in the US

Descriptions of metallurgical patents given below have been taken from details given in the Official Gazette of the United States Patent Office.

Production of Castings and Ingots

An exothermic composition for use in the production of steel ingots and castings consists essentially of a mixture of 15 to 30 per cent. aluminium and 45 to 84 per cent. iron oxide, calculated as Fe_2O_3, the said mixture containing, based on the weight of the aluminium, 1 to 8 per cent. of copper and 0 to 4 per cent. of nickel, the ratio of iron oxide, calculated as Fe_2O_3, to aluminium being within the range of 3.3:1 to 4:1. —2,937,425.

Ingot Mould Made of S-g. Iron

Ingot mould for steel ingots and other ferrous alloy ingots, characterized by the mould being composed of spheroidal-graphite cast iron and by a ratio:

$$\frac{V_1}{V_2}$$

between the volume V_1 of the mould side walls and the volume of V_2 of the mould cavity between 0.79 and 0.4 —2,937,424.

Specifications for the Investment-casting Industry in the UK

A footnote on page 147 (when the paper under the above title was printed in the August 4 issue of the JOURNAL) stated briefly that both the authors are attached to G. L. Willan, Limited. This is incorrect: Mr. L. S. Taylor is certainly chief metallurgist of Willan's, but Mr. A. G. Mason is chief metallurgist of Deritend Precision Castings, Limited. Apologies are recorded to readers and the persons and firms concerned.

Iron Castings Production

The high rate of production of iron castings in the first quarter of 1960 has been well maintained in the second quarter, according to a statement issued by the Joint Iron Council, based on figures calculated by the Iron and Steel Board (see Table 1). Total output of iron castings in the second quarter was 1,006,300 tons compared with 1,032,900 tons in the first quarter, the reduction of 2½ per cent. being due to the fact that both the Easter and Whitsun holidays fell in the second quarter.

Production by the various sections of the industry is detailed in Table 2. Commenting on the figures, the JIC points out that although these show that (with the exception of castings for railway equipment) output was lower in the second quarter than in the first, when allowance is made for a reduction of the working days it is evident that the daily rate of production in the automobile, ingot-mould and railway-equipment sections was slightly higher in the second quarter. In the pressure-pipe and engineering sections the level was maintained and in the building and domestic section only it was lower. For each section, production in the second quarter of 1960 was higher than in the the similar period for 1959, the improvement being most noticeable for ingot-moulds, and significantly large in the automobile, engineering and pressure-pipe sections.

TABLE 1.—*Production of Iron Castings, by District.*

District.	Iron castings (tons).	
	Second quarter, 1959.	Second quarter, 1960.
Eastern, South-Eastern (incl. London), Southern and South-Western	108,460	118,140
Midland	204,170	221,010
North Midland	185,360	213,390
East and West Ridings	84,500	90,370
North Western	85,240	96,460
Northern	78,890	110,090
Scotland and Northern Ireland	77,660	93,240
Wales	54,310	63,610
Total	878,590	1,006,310

Labour

The number employed in the ironfounding industry at the end of June, 1960, was 129,900—400 more than three months ago, and 6,300 more than at the end of March, 1959.

TABLE 2.—*Output of Iron Castings, by Section.*

Section.	Second quarter, 1960. (Thou. tons.)	Percentage. Previous quarter.	Change. Second quarter, 1959.
Automobile (including tractors) ..	201.7	0.0	+15.3
Engineering*	321.1	−2.8	+11.9
Building and domestic	138.1	−8.4	+ 1.8
Pressure-pipes† and fittings ..	145.8	−2.8	+15.3
Ingot moulds‡	134.8	−0.7	+48.8
Railway equipment	64.8	+0.5	+ 1.3
Total	1,006.3	−2.6	+14.5

* Including machine-tool, textile machinery, electrical, shipbuilding, etc. † Mainly gas and water. ‡ Mainly for the steel industry.

Sheepbridge Engineering Order-book Heaviest for Four Years

Work in hand at March 31, 1960, was more than at any time in the previous four years, states Lord Aberconway, chairman of Sheepbridge Engineering, Limited, colliery mechanical and electrical engineers, of Chesterfield. The increased industrial activity in 1959-60 benefited the company, and although there was a fall in demand for some products, there was an overall increase and a greater value of goods delivered than in any previous year.

All the subsidiary companies participated in the increased industrial activity. However, Sheepbridge Equipment, Limited, despite an increased demand for many of its products, suffered a setback in the sales of mining equipment through the pruning of capital expenditure programmes by the National Coal Board. Strenuous efforts were being made to find suitable work to enable the department normally engaged on the production of mining equipment to operate to full capacity.

Sales of all the other subsidiary companies were higher than in the previous year, record sales being achieved by Sheepbridge Stokes, Limited, Sintered Products, Limited, Bray Construction Equipment, Limited, Light Production, Limited, Twiflex Couplings, Limited, and Advance Motor Supplies, Limited.

The directors have thought it wise to extend the group's manufacturing capacity to meet the prospective increase in demand for many of its products. Additional capital expenditure is planned.

Wellman Smith Owen's Record Trading Year

The volume of contracts now in hand in all sections of Wellman Smith Owen Engineering Corporation, Limited, makers of open-hearth and industrial furnaces, ancillary plant, etc., of London, S.W.1, amounts to over £9,000,000 and is now approaching peak figures, according to the chairman, Sir Peter Roberts.

There is still a considerable amount of work in prospect for the iron and steel industry, both at home and abroad, which should ensure a continued increase in the activities of all those connected with the company, he adds. Much of the new business is in connection with the major steelworks extensions in Great Britain.

Records were attained by the Corporation during 1959-60 in turnover, and for the volume of contracts completed for both home and overseas. In addition to the numerous units of heavy plant and equipment manufactured for the UK steelworks, the volume of export business has been considerable.

The volume of business in the Corporation's Ross Valve division continues to increase, and there is a marked expansion of the overseas demand for this product.

At the annual meeting on September 22 it will be proposed that directors' remuneration be increased and that borrowing powers be brought up to date. The new article will not increase the directors' borrowing powers.

Incorrect Accounts and the Finance Act, 1958

By "Barrister-at-Law"

In the report by the Royal Commission on the Taxation of Profits and Income attention is drawn to the distinction between the submission by a taxpayer of accounts in lieu of a return, and the submission of a return in accordance with the requisite form. Accounts in substance, may well amount to what is in effect a return, but the penal provisions of the Income Tax Act 1952—which applied, where *inter alia*, a person neglected or refused to make any return, or made an incorrect return—did not extend to cases where accounts only had been submitted.

The Royal Commission advocated that accounts should be brought into line with returns in these respects, and that whenever a taxpayer submitted accounts, either in support of a figure that he had returned, or in lieu of a formal return, the accounts should rank as a return for the purposes of the assessment and penalty provisions of the Income Tax Act 1952.

Effects of Recommendations

These recommendations have now received statutory recognition in section 24 of the Finance Act 1958, which came into operation on August 1, 1958. In this section penalties are imposed for *incorrect accounts* submitted to the Revenue in connection with the ascertainment of a taxpayer's liability, these penalties being the same as those which are imposed by section 25 of the I.T. Act 1952, for neglecting or refusing to deliver or usefully delaying in delivering, true and correct returns. The penalty imposed according to sub-sections (3) (a) and (b) of section 25 of the I.T. Act 1952, will be "£20 and treble the tax which ought to be charged," when proceedings are by action in a Court of Law, or, when proceedings are before the Commisioners, a sum not exceeding £20, and treble the tax which ought to be "*charged*."

This provision, incidentally, was the subject of an important High Court judgment recently *I.R. v. Hinchy*. The Court in this case based its judgment on the presence of the word "chargeable." The phraseology of the Acts suggested a material distinction between the two words. The Act used the word "chargeable" where the liability for tax had not yet been quantified; whereas, it used the word "charged," only when the assessment had been made. In the case before the Court the taxpayer, prior to the proceedings for recovery of penalties for incorrect returns, had already been assessed and thus "charged" with all the tax for which he was liable. Therefore, at the date of the Crown's proceedings, there was no tax remaining with which he "ought to be charged under the Act," within the meaning of sub-section (3) of section 25. Accordingly the Crown's claim for penalties was limited to the £20 and nothing more could be claimed. Had no assessment been made at the date when the Crown's proceedings were instituted, then presumably the Crown might have been entitled to recover in addition, treble the tax.

That section 25 (3) may have startling results if the Revenue sought to impose it strictly is obvious when one considers that if a return was incorrect by even so small a sum as £1, the taxpayer might be liable to forfeit in addition to the £20, three times the amount of the tax for which he was assessable. For a taxpayer who was in the high levels of surtax, such a penalty might well be crippling, and be out of all proportion to the degree of error.

Returns and Accounts

To return to a consideration of the new section, and to the position with regard to returns—for the law as to returns is extended to *incorrect* accounts. In this connection, it is to be observed that fraud is not necessary to attract the penalty. An error in a return due merely to negligence, is sufficient, as was laid down in *A.G. v. Till* 1910 A.C. 50. The law, however, makes a distinction between the position where no return at all is made and the position where an *incorrect* return is made.

In the former case, the penalty is not exigible, unless notice requiring a return has already been served on the taxpayer; in the latter, no notice is necessary. The reason for this distinction is to be found in sub-section (6) of section 25. Under that sub-section, where a return (whether correct or incorrect) is made, the taxpayer will be deemed to have made it pursuant to a notice requiring a return. Similarly, the submission of incorrect accounts will now by reason of the above sub-section, be deemed to have been made in response to a notice requiring a return, so as to make the penal provisions of sub-section (3) of section 25 applicable. A double penalty, however, will not be exigible for submitting incorrect accounts, one for incorrect accounts and one for incorrect *returns*. Sub-section (2) of section 24 of the F.A. 1958 secures this respite for the taxpayer.

Where incorrect accounts have been submitted, the position may be rectified by the taxpayer by rectification of the accounts themselves. Once this has been done, no proceedings may be taken thereafter against the taxpayer (sub-section (3) of section 24). The meaning of sub-section (3) is not quite clear. While proceedings may not be *commenced* after such rectification of the accounts, can they nevertheless be *continued* if they have been already commenced before the rectification?

The corresponding provisions with regard to incorrect returns are to be found in section 55 of the I.T. Act 1952. Under sub-section (1) of that section, the taxpayer may rectify his return, and thereafter he will not be "liable to any proceeding by reason of his . . . wrong statement." These words are different from those in sub-section (3) of the F.A. 1958 which provides that where rectified

Incorrect Accounts and the Finance Act, 1958

accounts are submitted "no proceedings shall thereafter be taken." The reason for the difference in phraseology is not apparent. The point, however, is arguable, that the rectification of the accounts will constitute a ban even to the continuance of proceedings which have already been commenced. On the other hand, as far as incorrect *returns* are concerned, it would appear that proceedings commenced *before* a rectification of the returns will be continued (see sub-section (3) of section 55), though upon the delivery of a rectified return, the Commissioners have a discretion to stay the proceedings and a court of law has similar powers, if the Commissioners certify to the Court that no fraud or evasion was intended. The provisions of section 25 of the I.T. Act 1952 in these respects do not appear to have been extended to *incorrect* accounts.

Finally, it should be noted that according to sub-section (4) of section 24 of the F.A. 1958, the fact that the accounts were submitted without the taxpayer's consent or connivance will constitute a defence to any proceedings brought for penalties in respect of incorrect accounts.

Profits Tax

The corresponding penalty provisions in section 107 (1) and section 140 (1) and (2) of the I.T. Act 1918 and section 23 (1) of the F.A. 1923 with regard to neglect to deliver correct returns were applied to profits tax by section 28 (1) and Schedule VIII of the F.A. 1943. The penalty is the same, *viz.*, £20 plus treble the tax with which the taxpayer ought to be "*charged.*" The repeal and re-enactment in the I.T. Act 1952 of these provisions of the Acts of 1918 and 1923, does not affect their application to the Profits Tax by section 28 (1) and Schedule VIII of the F.A. 1943.

"Choice of Patterns for Sand-moulded Castings"

The *Centre Technique des Industries de la Fonderie* announce the publication this month of a brochure entitled (in translation) "Choice of Patterns for Sand-moulded Castings". A preview of the book reveals that it will contain tables which will immediately show the engineer the type of pattern to choose for a given casting from the technical and practical points of view. Also to help him, tables are included for different finishes for the final casting, whether the tolerance allowed be wide, average or close, and these are related to the number off. The new publication which is based on the report of a committee on which master patternmakers served, has every appearance of being most useful to the foundry industry.

THE INDEX OF THE BOARD OF TRADE for basic materials and fuel used in manufacturing industry (1954 = 100) fell from 102.3 in June to 102.1 in July. The wholesale price index for materials and fuel used in the electrical engineering industry rose by 0.1 per cent. to 117.2 in July, but the index for mechanical engineering materials was lower at 126.5 against 126.8 because of the reduced price of rubber.

SBAC Farnborough Exhibition

In addition to the particulars recorded in the JOURNAL of August 18 of stands at the Society of British Aircraft Constructors' annual flying display and exhibition to be held at Farnborough from September 5 to 11, the following details have been supplied of exhibits on Stand No. 5, of Sterling Metals, Limited. The company will show both sand castings and die- and precision-mould castings. Of the former, five examples will be on view—(*a*) Bristol Siddeley "Olympus" intermediate casing in magnesium/zirconium alloy ZRE1, weight 148 lb. (see illustration); (*b*) Napier "Eland" support-plate in magnesium/zirconium/thorium alloy Z.T.1, weight 110 lb.; (*c*) Fairey "Rotodyne" windscreen frame in magnesium/zirconium alloy R.Z.5, weight 24¾ lb.; (*d*) Dunlop "Viscount" landing-wheel hub in magnesium/zirconium alloy Z.5.Z, weight 60 lb.; (*e*) a De Havilland

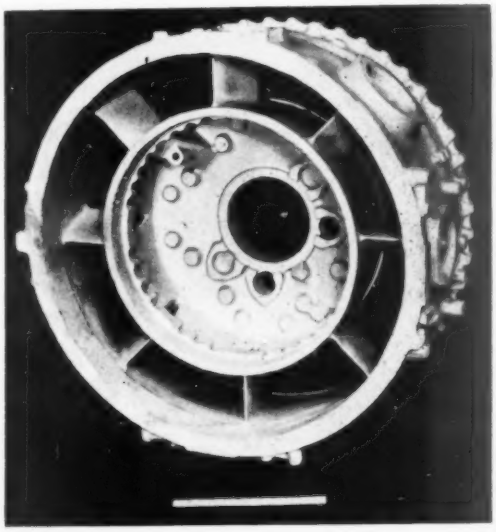


FIG. 1.—*Sand casting by Sterling Metals, Limited, of "Olympus" intermediate casing in magnesium/zirconium alloy, ZRE*1. *Weighing* 148 *lb., it is supplied to Bristol Siddeley Engines, Limited.*

"Comet IV" twin-boost casing in aluminium alloy DTD.298; (*f*) De Havilland "Sea Vixen" pylon-casing in magnesium/zirconium/thorium alloy T.Z.6, weight 37 lb., and (*g*) Bristol Siddeley "Proteus" air-intake casing in magnesium/zirconium alloy ZRE.1, weight 183 lb. The firm's die- and precision-mould castings will be covered by a comprehensive collection of smaller castings in both aluminium and magnesium alloys.

The David Brown organization will also be participating in the exhibition and on their stand (No. 80) will be showing a selection of castings and gears used by the aircraft industry, prominence being given to airframe and engine components in high-tensile and heat-resisting steels. As in previous years, David Brown Taskmaster tractors will be in use for the ground movement of aircraft and equipment during the period of the show.

Equipment & Supplies

Vibratory Feeder

Magco, Limited, Lake Works, Porchester, Hants, have created a new design of magnetic vibratory feeder for the automatic conveying of free-flowing materials such as sand, powders, granules and the like, and are producing it in a range of sizes. It is stated to be extremely simple, there being only three parts, *viz.*: the cast-aluminium tray (complete with magnetic vibrator) and two cast-aluminium reversible stands for either base or overhead fixing—provision being also made for a 10 deg.-angle adjustment of the tray.

The use of castings has enabled production costs to be reduced and permits the supply of units "off the shelf," it is stated. A "controller" is incorporated, which, whilst the feeder is in operation, enables infinite variation of the feeding rate from zero to maximum to be achieved. The example is cited where one of the units, employing a tray 8-in. wide, has a maximum output of 10 tons per hour and yet can be adjusted to deliver, over its whole width, an even and constant "feed" of 1 lb. per hour of fine silica sand.

Mould-drying and Chill-heating Stove

One of the dangers with which the maker of chilled rolls and other users of chills have to contend is possible contamination of chills as a result of acid attack during the stoving period, in which the chills are brought up to temperature. The cause of this is well known—condensation of the products of combustion on the cold metal, a condition which persists until the temperature of the metal in the stove has passed its dew-point. Indirect heating of stoves provided one answer to the problem, but the resultant loss of efficiency in stove-performance coupled with increased fuel consumption (as compared with direct-fired stoves) showed this to be an expensive alternative, and any leakage in the heating ducts tended to nullify any advantage that may have been gained by the changed design.

The foregoing, of course, applies only to fuel-fired stoves and not to those heated electrically. With the advent of cheaper rates for electricity during "off-peak" loading, advantages to be gained from using electrically-heated stoves became obvious, and received serious consideration from a number of well known rollmakers, amongst whom was Miller & Company, Limited, of Edinburgh. This company placed an order with Modern Furnaces & Stoves, Limited (Booth Street, Handsworth, Birmingham, 21) for two electrically-heated chill stoves (Fig. 1), and these have completed their first year in operation and have proved themselves to be quite satisfactory in service. Drying and chill heating is mainly carried out overnight, so as to take full advantage of the special rates obtaining during the "off-peak" periods, and this coupled with the efficiency obtained with electric heating stoves make the arrangement an economical one. Another advantage claimed is that owing to the absence of products of combustion, moulds and chills are perfectly clean and foundry conditions are improved as there are no fumes to escape into the atmosphere. Automatic control of the temperature and drying cycle disposes of the need for a night attendant. (It may be added that for the conversion of existing stoves, the supply firm have designed self-contained electric-heating units with full thermostatic control, programme control and overriding thermostat to prevent overheating of the elements.)

Suction Cleaner

A new model of a portable industrial suction cleaner was demonstrated to the Press in London recently. Known as the Air-O-Flow model, it is produced by Exhall Grinding and Engineering Company, Limited, of Bayton Road, Exhall, Coventry. Of compact shape, the unit contains no moving parts, being operated on induced suction produced by compressed-air (from mains' supply) acting through a venturi gun. It was demonstrated that the machine, in addition to extracting dust from ledges, upholstery, etc., in the same manner as a domestic cleaner, will pick up objects as heavy as bolts and nuts or broken glass and transfer them to the interior of the filter bag. Applications in the foundry industry would seem to include all the normal purposes for which vacuum cleaners are used, in addition possibly to the removal of sand spillage from deep pockets of moulds and the clearing of sand from internal cored spaces of castings (Fig. 2).

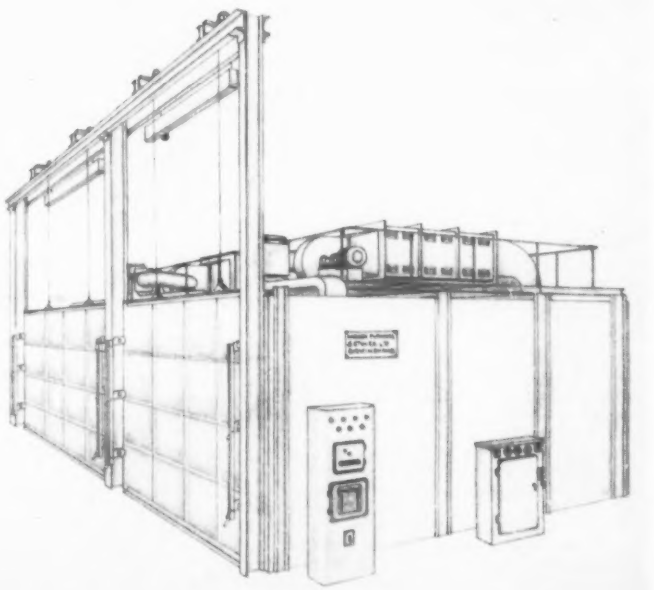


FIG. 1.—*Pair of electrically-heated stoves for drying moulds and heating chills in a roll foundry.* (*Modern Furnaces & Stoves, Limited.*)

FIG. 2.—*Industrial vacuum cleaner being used at the works of Jaguar Cars, Limited, on the cylinder-head line to remove swarf after machining. (Exhall Grinding and Engineering Company.)*

The cleaner requires 9 cu. ft. compressed air per min. at 80 lb. per sq. in. for the standard size gun (and 11 cu. ft. per min. for ¼-in. nozzle gun). It is stated to have a suction of 45 in. water-gauge—powerful enough to hold a 1½-lb. weight at the nozzle. It is also capable of removing fluids from tanks (for which purpose the bag is removed), and lifting swarf, wood shavings, metal chippings, etc.

Plant for Aluminium Swarf

A comprehensive handling, storage and sifting plant for the manufacture of exothermic compounds, mainly from aluminium swarf, has been supplied to Berk Exothermics, Limited, by Thomas Robinson & Son Limited, of Rochdale. These compounds are for use in the foundry industry for providing extra heat for feed-metal, and their manufacture in Britain is comparatively new. The swarf used includes dressings, grindings and dross from casting producers, and powdered refined aluminium. After screening in a Robinson Hexman machine, highly efficient sifting is provided by the supply-firm's Minisifter, a compact unit occupying a floor area only 4-ft. square, but with a sifting area of 54 sq. ft. It will take three tons per hour of the material from storage bins and has a stack of six leak-proof sieves, clamped to a base and gyrated in a 2 in. (51 mm.) circle at 250 rpm. Products of three mesh sizes are produced by this machine, *i.e.*, swarf retained on 40's wire mesh (0.503 mm. aperture), that retained on 70's wire mesh (0.261 mm.) and that passing through 70's wire mesh. The final item of plant is a 5-ton batch unit wherein iron oxide, dextrine and other chemicals are mixed with the aluminium.

Compressor

A new oil-flooded rotary "Power Vane" compressor having a capacity of 260 cu. ft. per min. at 100 lb. per sq. in., has been introduced by the Consolidated Pneumatic Tool Company, Limited, of 232, Dawes Road, London, S.W.6, a special feature being the new styling which has been adopted. The compressor has been made to meet the demand for a unit between the existing sizes of 210 and 365 cu. ft. per min. It uses an eccentric rotor, equipped with sliding vanes to compress air in a cylindrical chamber into which oil is pumped as a fine spray, the oil serving to lubricate, to seal clearances and to cool the air at the time of compression. The 260-RO-2 model is a two-stage, in-line, compressor, powered through a safety friction drive by a six-cylinder Leyland U.E. 375 diesel engine.

NCK-Rapier's Agreement with Koehring

Under a new arrangement, NCK-Rapier, Limited, London, S.W.1, is to be exclusive selling agent in most of the eastern hemisphere for the Koehring Company of the USA. The agreement will operate primarily for Koehring excavators and cranes, but it is expected that an extension of the activity will cover eventually road and building equipment, dumpers, and other Koehring products.

NCK-Rapier is the selling organization for excavators and cranes made by Newton, Chambers & Company, Limited, the parent company, Thorncliffe, near Sheffield, and by Ransomes & Rapier, Limited, Ipswich.

Electric Welding: Research & Control Instruments, Limited, 207, King's Cross Road, London, W.C.1, announce that up to 12 lb. of metal deposited per hour is claimed for the Philips manual CO_2 welding equipment, now in production after extensive field trials. It is also stated that all-positional welding is practicable, using conventional d.c. power sources—overhead, vertical up, vertical down, and downhand welding can all be done in sequence without change of current and voltage.

Synthetic Moulded-in Bearings. A leaflet received from E. Farrell and Son, Limited, West End Engineering Works, Oldham, deals with Roll-Far synthetic bearings which are claimed to need no oiling. It is said that they are specially applicable to roller conveyors installed in foundries. The material used is polyester resin re-inforced with glass fibre and can be moulded into any type of steel or alloy tube, it is claimed.

Re-use of Files. File Restorers, Limited, 93, Sheen Road, Richmond, Surrey, have developed what they claim to be an entirely new chemical process for the rehabilitation of worn files. It is stated that files submitted and found to be unsuitable for restoration are rejected after inspection, but these represent only 5 per cent. of those sent in.

Bentonite. Bromhead & Denison, Limited, 310/312, Regent Street, London, W.1, have taken up the UK and Northern Ireland agencies for the Magnet Cove Barium Corporation, Des Plaines, Illinois, USA, producers of Yellowstone, Auto-bond and Southern Star bentonites.

News in Brief

THE TENTH ELECTRICAL ENGINEERS EXHIBITION is to be held at Earls Court from March 21 to 25, 1961.

BRITISH ENGINES, LIMITED, has plans in hand for the erection of a foundry storage building at Glasshouse Street, Newcastle-on-Tyne.

LAWS & SON (STAINES), LIMITED., patternmakers, have opened a northern branch of the business at Pottery Lane, Newcastle-on-Tyne.

THE BRANCH OFFICE of United Dominions Trust, Limited, in Guildford, has moved to new premises at Norfolk House, Upper High Street, Guildford.

PINKSTON IRON FOUNDRY, Glasgow, of David Rowan & Company, Limited, engineers, is expected to close at the end of October to permit an expansion of the firm's brass shop. An official statement is to be made shortly.

THE CURRENT PROGRAMME for the October and November meetings of the Institution of Production Engineers includes no fewer than four papers on precision casting of various types, to be presented at section meetings.

BABCOCK & WILCOX, LIMITED, are building a new type of level-luffing jib crane to the order of the Fairfield Shipbuilding & Engineering Company, Limited, Glasgow, at their Dalmuir works. The new crane will have a lifting capacity of 80 tons at 90 ft. radius.

MR. ALFRED PARRAMORE, joint managing director of F. Parramore & Sons, Limited, ironfounders, Chapeltown, presented the prizes to the works angling section at the Scout Hall, Chapeltown, on August 15. Mr. J. Allott, winner of the individual section, received the Parramore Cup.

WICKMAN, LIMITED, Coventry, announce the assumption of sole selling rights in the United Kingdom for the range of machine-tools produced by the Gisholt Machine Company, Madison, Wisconsin, USA, and its associated subsidiary company, Gisholt Machine Company (Great Britain), Limited.

HALL, RUSSELL & COMPANY, LIMITED, Aberdeen, have secured an order for a single-screw diesel tug for service overseas from the Pacific Steam Navigation Company, Limited, Liverpool. They have also received orders for three new trawlers for the newly-formed Aberdeen firm of Parbel-Smith, Limited.

WALKER, CROSWELLER & COMPANY, LIMITED, of Cheltenham, have opened a new office block in the town. This houses their sales and service departments, which retain the old telephone number (Cheltenham 56317) and address. Departments at the factory (accounts, works offices, buying and publicity) have a new number: Cheltenham 56366.

THE WHOLE of the issued share capital of Douglas Elliot & Company, Limited, steel-stockholders, Leeds, has been acquired by Miles Druce & Company, Limited, London. The new board will consist of Mr. G. P. Philipson-Stow; Mr. Douglas Illingworth; Mr. A. E. Best; Mr. S. Druce; Mr. A. S. Heath, and Mr. D. A. Illingworth who will also be secretary.

MORE THAN 1,000 FOUNDRY EMPLOYEES at the Clydebank factory of the Singer Manufacturing Company, Limited, decided last week-end not to support an overtime embargo and threatened strike by about 8,000 of the 15,000 employees. The dispute is over a demand by shop stewards for a revision of the grading and merit payment system, which does not apply to foundry personnel. They are on piece rates.

PAPERS of the British Institute of Management's one-day conference on the Government Pension Scheme were published last week. A short introduction has been specially written by the conference chairman, Mr. G. R. Moxon, chairman of the BIM Human Relations Advisory Committee. The papers are available for 7s. 6d. (or 6s. to delegates of the conference and BIM members).

WEST YORKSHIRE FOUNDRIES, LIMITED, Saynor Lane, Hunslet, Leeds, have been awarded the Harewood Bowl, the trophy which is competed for every half-year by industrial savings groups. In the six months ended March 31 last, between 500 and 600 employees, representing 16.6 per cent. of the firm's total personnel, saved £9,087. The trophy was presented to Mr. George Todd, representing the savings group, by the Lord Mayor of Leeds.

A CONTRACT worth £339,000, for six steelworks process line drives, has been received by Associated Electrical Industries, Limited, motor and control gear division, from Richard Thomas & Baldwins, Limited. All the electrical equipment will be installed at the new Spencer Works at Llanwern, near Newport (Mon), and the line drives are to be completely erected, commissioned and available for commercial production by the end of September, 1961.

WHEN SOME 150 MOULDERS and labourers at the Whifflet Foundry of R. B. Tennent, Limited, Coatbridge, Lanarkshire, collected their pay packets at the week-end they also received a letter from the management telling them that they were working a week's notice and would be paid off to-morrow (Friday) unless they conformed to normal practice. For some time the men concerned have been refusing to work overtime because they feel they have a grievance over a bonus dispute. It is understood that the question of bonus is under review by the firm not only for the foundry department but for the works generally.

BRITAIN'S FIRST LIQUID-HELIUM PLANT to be run by an industrial organization started service recently at the Morden, Surrey, works of British Oxygen Research & Development, Limited. The plant will produce sufficient liquid helium to meet all present demands from industry and research bodies in this country. The National Physical Laboratory, Teddington, which has run a plant for a number of years, is now gradually discontinuing production and handing over its customers to BORAD. The only other sources of liquid helium in the United Kingdom are certain university laboratories, where low-temperature research is carried out.

SPECIAL TWO-WEEK COURSES to develop latent qualities of leadership among industrial apprentices have been arranged by the Central Council of Physical Recreation, and are to be held at the Council's Snowdonia National Recreation Centre at Plas y Brenin, Capel Curig. The first course will be from October 1 to 15, 1960, and the second, from February 25 to March 11, 1961. The courses are open not only to apprentices but to young men in industry between 18 and 22 years of age, and will be under the direction of the warden, Mr. John A. Jackson, a member of several Himalayan expeditions. The all-in fee for each course will be £20, and firms should apply for full details to the general secretary of the Central Council of Physical Recreation, 6, Bedford Square, London, W.C.1.

Company News

Hardypick reject Laycock Offer

The directors of Hardypick, Limited, mining tools and machinery manufacturers, of Sheffield, state that having regard to trading prospects and to professional valuation and advice, they consider it unreasonable that Laycock Engineering, Limited, Sheffield, should acquire net assets calculated at £539,751 for £272,500. They do not consider the offer fair and reasonable, do not intend to accept the offer for their own preference and ordinary shares, and do not recommend ordinary holders to accept. Laycock is offering 65s. for every £1 ordinary and 30s. for each £1 7 per cent. cumulative preference share.

Mr. T. G. Jameson, Hardypick chairman, states that the falling profit trend has been reversed and for the year ended June 30, 1960, the profit, before tax, of £30,011 compares with £13,939 previously. This has been achieved despite shortages in supplies of steel and delays in delivery of hickory timber.

Unless the offer becomes unconditional, the directors intend to pay a final dividend of 17½ per cent., making 25 per cent. for 1959-60. In view of the improving trend of trade the directors anticipate maintaining future dividends at no less rate. For each of the past six years holders have received 20 per cent.

GRAHAM FIRTH STEEL PRODUCTS, LIMITED—The offer by Brightside Engineering Holdings, Limited, to acquire the company has been accepted by the holders of all of the shares which were subject to the offer.

B. ELLIOTT & COMPANY, LIMITED, machine-tool makers, of Cardiff—Unchanged final dividend of 10 per cent. maintains 17½ per cent. for the year ended March 31, 1960. Group trading profit rose from £201,345 to £269,622, with a net profit, before tax, of £168,893 (£10,701).

SIEBE GORMAN & COMPANY, LIMITED, manufacturers of life-saving and breathing-equipment, etc., of Chessington (Surrey)—The offer by the Fairey Company, Limited, to acquire all the issued ordinary 5s. shares has been accepted in respect of over 93 per cent. of the shares. The offer is now unconditional.

EXPANDITE, LIMITED—Both turnover and profits in the current year are continuing to rise, states the chairman, Mr. B. Watson. An increasing range of products is being successfully marketed at home and the current order position is strong, while participation in world export markets increases each year. Three additional buildings are shortly to be taken into use to expand UK production.

INTERNATIONAL COMBUSTION (HOLDINGS), LIMITED—The interim dividend is maintained at 10 per cent. The chairman, Sir James Reid Young, stated in his last review that for the next two or three years a decline in the trading profits earned must be expected. It is forecast that it will be possible to pay the same 30 per cent. total dividend as for the previous year, but the profits will show a decrease.

B.H.D. ENGINEERS, LIMITED—Mr. F. B. Holmes, the chairman, warns that the current year's profits are expected to fall somewhat below those of the 12 months ended March 31, 1960. Business on hand is not sufficient to keep those companies producing heavy engineering plant engaged to full capacity. The problem caused by the much reduced work for the coal, gas, and steel companies continues and can only be met by new techniques and products, which policy the board is pursuing.

FIRTH BROWN TOOLS, LIMITED—The latter months of the year have seen a further expansion of sales, states Mr. Eric Mensforth, the chairman. This resulted in an improved consolidated profit, before tax, for the year of £467,463. Capital expenditure during the year was slightly less than in recent years at £125,348. It is planned to spend at a higher rate during the next three years to provide buildings and production facilities for further expansion. A machinability research department is nearing completion.

NEWMAN, HENDER & COMPANY, LIMITED—Future prospects, states Mr. Noel P. Newman, the chairman and managing director, are to a considerable extent dependent on the demand from the petroleum industry, which does not at present show any real sign of improvement. The acquisition of Sydney Smith & Sons (Nottingham), Limited, gives a wider coverage of the field of demand for valves and has improved efficiency within the group and Mr. Newman is confident that it can maintain its position of steady progress and development.

DOWTY GROUP, LIMITED—Forward prospects are good, states Sir George Dowty, the chairman. He is confident that further progress can be looked for. Additional products introduced have opened new markets, both at home and overseas, so that opportunities are even more widely spread than hitherto. In this connection mining equipment has been successfully exported to Poland and the US, where good potentials are foreseen. A licensing agreement has been entered into in Japan whereby pitprops are now being produced in that country. An "impressive export record" has been achieved in aircraft accessories, of which the group is now the largest manufacturer. Group net profit increased from £1,078,139 to £1,570,820 and the tax-free dividend is effectively increased by 2.2 per cent. to the equivalent of 9.1 per cent.

Wellington Tube bid for Gibbons

An offer of 120s. cash per share for the 401,240 issued £1 ordinary shares of Gibbons (Dudley), Limited, manufacturers of refractories and coal carbonizing plants, of Dudley (Worcs), is to be made by Wellington Tube Holdings, Limited. The offer will be recommended by the Gibbons (Dudley) board.

An offer for Gibbons has already been made by the Wellman Smith Owen Engineering Corporation, Limited, of 230s. cash plus one Wellman share for four Gibbons shares. The closing price on August 24 for Wellman of 160s., valued each Gibbons share at 97s. 6d. Wellman's offer, which was direct to holders, as no agreement was reached in discussions with the Gibbons' board, was due to be sent out at the end of last week.

A joint announcement by Wellington Tube and Gibbons (Dudley) states that the board of Gibbons will continue in office as at present, but there will be an interchange of directors. The position of the staff and employees will remain unchanged. Wellington Tube and Gibbons (Dudley), it is stated, have common interests in future technical developments on the engineering side of their respective businesses.

The announcement adds that an approach was made by Wellington to Gibbons at a time when discussions were already taking place between Gibbons and Wellman Smith Owen, and in view of this, Gibbons and Wellington agreed that negotiations between them could not then be opened. Subsequently Wellman announced the terms of its offer, which the directors of Gibbons considered inadequate, and "therefore felt themselves free to negotiate with Wellington."

Guest Keen Reorganization

Board of Guest Keen & Nettlefolds, Limited, announces that for administrative reasons the separate steel companies in the GKN group are to be amalgamated from January 2 next. To effect the amalgamation, Guest Keen Iron & Steel Company, Limited, will change its name on that date to G.K.N. Steel Company, Limited, and will acquire the undertakings and assets of Brymbo Steel Works, Limited, John Lysaght's Scunthorpe Works, Limited, and its subsidiary, the Scunthorpe Rod Mill, Limited, which companies will then be liquidated.

At the same time it is announced that Mr. Charles Reginald Wheeler, 56-year-old chairman of Guest Keen Iron & Steel Company, and one of the leading figures in the British steel industry, is relinquishing that post at the end of this year. He has been appointed an additional vice-chairman of Associated Electrical Industries, Limited, and will take up executive duties with AEI in 1962.

An announcement by AEI says that, besides the additional vice-chairman, there will be changes in the AEI board. Viscount Head (formerly Mr. Antony Head, MP) has resigned as a result of his appointment as the first High Commissioner in the Federation of Nigeria, and Sir Joseph Latham, who retired as deputy chairman of the National Coal Board last week, has been elected to the AEI board.

Directors and Management

The statement regarding the amalgamation of the GKN group steel companies says that GKN Steel Company will, from January 2, 1961, operate through the following works: Brymbo Steel Works, at Brymbo, near Wrexham; Guest Keen Iron & Steel Works, at East Moors, Cardiff; and Lysaght's Scunthorpe Works, at Normanby Park, Scunthorpe.

Its board of directors will be:—Chairman, Mr. K. S. Peacock; deputy chairman and general managing director, Mr. H. W. A. Waring; managing directors, Mr. D. Bruce-Gardner and Mr. E. V. Callin (Lysaght's Scunthorpe Works); Mr. E. Davies (Brymbo Steel Works); and Mr. L. R. P. Pugh (Guest Keen Iron & Steel Works); while the other directors will be Mr. N. R. R. Brooke, Mr. R. P. Brookes, Sir John Green, Mr. Aubrey Jones, and Mr. E. C. Lysaght.

It is intended that the three works of GKN Steel Company will be operated under the same management as the existing separate companies, whose directors will become local directors of GKN Steel Company as follows: Brymbo Steel Works—Mr. H. W. A. Waring, Mr. D. Bruce-Gardner, Mr. E. Davies, Mr. P. H. Meadows, and Mr. L. R. P. Pugh; Guest Keen Iron & Steel Works—Mr. H. W. A. Waring, Mr. N. R. R. Brooke, Mr. D. Bruce-Gardner, Mr. E. Davies, Mr. S. W. Evans, Hon. R. G. Lyttelton, Mr. C. F. Pagnamenta, Mr. L. R. P. Pugh, Col. C. G. Traherne, and Mr. E. M. Yorath; and Lysaght's Scunthorpe Works—Mr. H. W. A. Waring, Mr. D. Bruce-Gardner, Mr. E. V. Callin, Mr. P. J. Cockram, Mr. E. Davies, and Mr. L. R. P. Pugh.

Mr. Waring will act as chairman of the local boards with Mr. Davies as managing director responsible for Brymbo Steel Works, Mr. Pugh as managing director responsible for Guest Keen Iron & Steel Works, and Mr. Bruce-Gardner and Mr. Callin as managing directors responsible for Lysaght's Scunthorpe Works.

THE PURCHASING OFFICERS ASSOCIATION announce a programme, covering 1961, of various types of tutorial courses for both young and experienced buyers. Details are available from the Association, Wardrobe Court, 146A, Queen Victoria Street, London, E.C.4.

£2,000,000 Copper Project for New Zealand

A copper manufacturing industry is to be established in New Zealand by Imperial Chemical Industries of Australia and New Zealand, Limited, (ICIANZ) and Yorkshire Imperial Metals, Limited, Leeds—in which ICI is an equal partner with the Yorkershire Copper Works, Limited. New Zealand at present imports all its copper manufactures and the new industry, involving a capital outlay of more than £2,000,000, will be based on imported ores. The net saving to the country in foreign exchange will be more than £500,000 a year.

Pressure from the New Zealand authorities to effect this saving is believed to be one of the reasons behind the move. Other factors are the prospect of rapid growth in the consumption of copper products, and the increasing competition from other exporters, especially from Australian and other UK companies. If the new plant takes the whole New Zealand market the loss to this country will be about £2,000,000 of direct exports a year, or about 4 per cent. of all copper exports.

Apart from refining copper the plant will also make copper-alloy sheet, strip, and tube. It is expected that ICIANZ will form a subsidiary to conduct the manufacturing operations. Details of the capital structure are not available, but the parent companies state that 25 per cent. of the equity will be offered for public subscription in New Zealand. The New Zealand Government supports the project, which is still subject to ratification by the two boards and by the UK Capital Issues Committee and the Treasury.

American Letter

Non-Ferrous Founders' Society

Emphasis on financial management and sales and the increasingly important problem of small foundry mechanization will "highlight" the programme for the 1960 meeting of the Non-Ferrous Founders' Society to be held on October 13 to 15 at the Grove Park Inn, Asheville, North Carolina, USA. On October 12, the Cast Bronze Bearing Institute—a product group of NFFS for bearing producers, will hold its annual meeting. The technical sessions held in the mornings of October 14 and 15 will include a paper entitled "Nature, Properties and Engineering Applications of Non-ferrous Alloys," by D. F. A. Flinn, NFFS technical consultant, and there is to be a panel discussion on "Is Mechanization Practical for the Small Foundry," and Mr. J. E. Graf, treasurer of Mansfield Brass & Aluminium Corporation, Mansfield, Ohio, will present a paper on "Business Analysis and Profit Evaluation."

Not *so* fast !

Readers have queried the figure of 100 ft. per minute quoted as the speed of production of continuously cast non-ferrous billets and bars from a machine which is being installed at Roto-Cast Company, Limited, Toronto (this column, July 28 issue of the JOURNAL). It has now been established that the error appeared first in an American Journal and that the figure should be 100 ft. per hour.

THE GRAY IRON FOUNDERS' SOCIETY is to hold its 32nd. annual meeting at the Netherlands Hilton Hotel, Cincinnati, on October 12 to 14. The theme of the two-day meeting is an appraisal of both problems and opportunities in the grey-iron castings industry.

Personal

Mr. R. TIBBY has been appointed an additional director of Sankey & Son (Holdings), Limited.

Mr. B. BUXTON has been appointed foundry manager of Newgate Foundry Company, Limited, Barnard Castle.

Mr. W. V. S. SINCLAIR has resumed chairmanship of the A.B.C. Coupler & Engineering Company, Limited.

Mr. T. HURST C.G.I.A. has been appointed foundry manager of the Stockton Casting Company, Limited, Stockton-on-Tees.

Mr. G. F. DUFFIN has been appointed works manager of the Stockton Steel Foundry of Head Wrightson & Company, Limited.

Presentation was made recently to Mr. H. E. HALL on his retirement as manager of the excavator spares department of Newton Chambers & Company, Limited, Sheffield.

Mr. F. WHIDBY, of the staff of Imperial Chemical Industries, Limited, has taken up an appointment as organization and method and work-study officer with the Sheffield Regional Hospital Board.

Mr. RUPERT SPEIR has been elected a director of Venner, Limited. He succeeds Mr. G. H. GUNSON, who has resigned as a director in order to be able to devote more time to his other interests.

Mr. A. L. BAKER is the new chairman of William Douglas & Sons (Engineering), Limited, London, a member of the Baker Perkins group. He succeeds Mr. W. S. DOUGLAS who remains a director.

Mr. H. W. HINTON, home-trade sales manager for Smith & David, Limited, Beacon Works, Wednesbury, has retired after nearly 48 years with the company, but will remain available in a consultative capacity.

Mr. FREDERICK W. WATSON has been appointed representative for the City of London, South of London, and the counties of Kent, Surrey and Sussex, for Arthur Shaw & Company, Limited, ironfounders and die-casters, Willenhall.

Mr. WILLIAM T. BRADLEY has been appointed a director of International Minerals & Chemicals, Limited. He will succeed Mr. EDWARD F. PERKINS as managing director with effect from September 1. Mr. ROBERT E. FORD has been appointed a director.

The JOURNAL'S American correspondent, Mr. J. S. VANICK, late of International Nickel Company, Inc., in New York, is to attend the International Foundry Congress to be held at Zurich from September 19 to 24, and will pass through London on his way to and from the continent.

Mr. WILLIAM MCILWRAITH, Q.C., and Mr. KENNETH MACKENZIE, have been appointed directors of Glencairn Metals, Limited, Motherwell, Lanarkshire. Mr. MacKenzie, who is general manager of the firm, took up his appointment a few months ago from the Lanarkshire Steel Company, Limited.

The Minister of Power has appointed Mr. P. T. MENZIES as a part-time member of the Central Electricity Generating Board in succession to Mr. G. A. S. Nairn, who has retired. Mr. Menzies is financial director of Imperial Chemical Industries, Limited, and a director of Yorkshire Imperial Metals, Limited.

Longest-serving employee at John Harper & Company, Limited, Willenhall, Staffs., 73-years-old Mrs. SARAH HAYES has retired after 61 years service. Mrs. Hayes joined the firm in 1899 in the coremaking department and was later promoted to forewoman. On leaving the firm she was presented with a portable radio-set and a picnic-luncheon basket.

Mr. C. H. T. WILLIAMS and Mr. E. G. PLUCKNETT have been appointed to the board of Tube Investments, Limited. Mr. Williams is chairman of Park Gate Iron & Steel Company, Limited, and the Round Oak Steel Works, Limited, and Mr. Plucknett is managing director of the Simplex Electric Company, Limited; all three are subsidiaries of Tube Investments.

Lord PLOWDEN (chairman), Sir GEOFFREY CROWTHER and Mr. H. F. R. CATHERWOOD have been re-elected to the board of the British Aluminium Company, Limited, a subsidiary of Tube Investments, Limited. Mr. G. A. ANDERSON, Mr. E. F. O. GASCOIGNE and Mr. J. RITCHIE have also been re-elected to the board. Mr. L. B. ROBINSON and Mr. R. G. H. LINZEE have retired from the board.

Mr. C. G. ROBERTS has been appointed commercial director of Fairey Engineering, Limited. Mr. Roberts, who is 44, was, until recently, managing director of Britvic, Limited, and its subsidiary companies, and a director of Vine Products, Limited. He retains his chairmanship of E. & H. P. Smith, Limited, general engineers, Birmingham. Fairey Engineering is one of the member companies of the Fairey group.

Mr. WILLIAM RONALD MILLS has joined Stanley Works (G.B.), Limited, joiners' tools manufacturers, Sheffield, as general sales manager taking charge of those functions previously carried out by the sales director, Mr. WARWICK M. DINGLEY. Mr. Dingley recently took up the new appointment of director of marketing in Europe for the whole of the Stanley organization, although he remains on the board of directors of the British company.

The Minister for Science has reappointed the following as part-time members of the UK Atomic Energy Authority:—LORD CITRINE, from January 1, 1961, when his present term of office expires, to December 31, 1961: Sir JAMES CHADWICK, from August 21, 1960, to August 20, 1962; and Mr. C. F. KEARTON, from October 17, 1960, to October 16, 1965. Lord Citrine is a part-time member of the Electricity Council and was chairman of the Central Electricity Authority, 1947-57. Mr. Kearton is a managing director of Courtaulds, Limited, and chairman of Gossard (Holdings), Limited.

Nineteen-year-old Mr. JACK SEMPLE who last year won the United Kingdom "Apprentice of the Year" award, returned last week after working for nine months in Australia. At a Press conference, organized by the British Junior Chambers of Commerce, Mr. Semple said he had extended his knowledge into many fields of engineering, and had worked with 11 Australian companies, the products ranging from "nylons" to missiles. Whilst he saw no technical training in Australia which was in advance of what he himself was receiving, "much of it was on a par." Mr. Semple is learning turbine engineering at the Association Electrical Industries' factory at Larne, County Antrim. His Australian visit was sponsored by the British Junior Chambers of Commerce.

Obituary

The death has occurred of Mr. STEWART A. DAVIDSON, works manager of the Clyde Crane & Engineering Company, Mossend, Lanarkshire. He joined the firm as a fitter and his association with the company lasted for over 30 years.

BAKER PERKINS FOUNDRY TEAM

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The photograph below shows one of eight matched Baker Perkins units chosen to provide all the mixing requirements for an automotive grey iron foundry in the U.S.A. A strong line of five B-P (150 tons per hour) 5A Continuous Moulding Sand Mullers delivers consistently uniform sand into the moulding shop. Behind them a B-P Core Paste Mixer and a B-P Core Wash Mixer ensure excellent core surfaces. Centre of the team is the B-P Refractory Clay Mixer for lining ladles and cupolas.

After four years of gruelling operation this B-P equipment has proved itself in all respects. It is built to do a rugged job consistently and with minimum maintenance.

For further details of this and other foundry machinery write to:

Baker Perkins Limited, *Engineers*

BEDEWELL DIVISION, HEBBURN-ON-TYNE, Co. DURHAM.

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BPF9

Raw Material Markets

Iron and Steel

Demands for high-quality castings continue at levels which enable most of the engineering and speciality foundries to maintain satisfactory outputs. There is no appreciable slackening in the call for castings from the trades which have kept these foundries busy for a long period, although in some instances the quantities of pig-iron now being specified show some reduction on previous deliveries and the pressure for supplies is not so heavy. Producers of the grades of pig-iron required by these foundries—low-phosphorus irons, which are chiefly in demand, hematite, and refined iron—are able to satisfy present demands easily, and in practically all brands of these irons present deliveries could be increased appreciably if necessary. The labour force at many of the engineering foundries is still below requirements, and outputs of castings are affected adversely.

The light foundries could undertake much more work than that now on hand. The building trades continue to specify reasonably good quantities of castings, but only moderate demands are being made by the domestic utensil trade. The jobbing and textile foundries are reasonably well employed. The call for high-phosphorus pig-irons is moderate and the furnaces have tonnages to spare from outputs and stocks held by them.

Because of the present easy supply position of all grades of pig-iron, the foundries are content to specify only those tonnages which are needed for consumption and a small working stock, and there is little forward buying.

Apart from the better grades of cast-iron scrap such as cylinder blocks and special qualities, the foundries are able to obtain all the scrap they require without difficulty. Foundry and furnace cokes are in good supply, and ganister, limestone, and firebricks are available on demand.

Steel re-rollers have good order-books and satisfactory demands continue to be made for all their products, including small bars, light sections, and reinforcing rods. The shortage of suitable labour only, prevents increased outputs being obtained, as the re-rollers have adequate supplies of steel semis available to implement the work on hand.

The demand for sections and joists continues to be maintained, with the result that many of the more popular sizes have almost disappeared from the mills' rolling programmes, due to the heavy forward bookings. Some capacity is still available for some special sizes in forward and current programmes, but the position is becoming more acute each week. Plates of all descriptions maintain their demand, and with makers well covered for some months ahead delivery dates, particularly for the lighter thicknesses, are being extended. The placing of orders for cold-reduced sheets is a big problem, as makers are already overloaded, but supplies are being received from the Continent and America, which has relieved the position to some extent.

Non-ferrous Metals

Export controls on tin have been lifted. At a meeting of the International Tin Council last Friday, it was announced that the council had decided not to fix export quotas for the three months beginning October 1. The decision was made, it was stated, "in view of the statistical position." It was explained that production in at least one member country has been declining in the last few months, with a consequent fall in stocks.

Tin export quotas are reviewed about every three months. Presumably the idea is that producing countries that can step up production should be allowed to do so to make up for shortfalls elsewhere.

Tin prices in London fell sharply on the news of the ITC decision, but later recovered when it was seen that Singapore reaction was small. It seems now to be accepted that the supply position is little changed.

London warehouse stocks of copper rose recently to higher levels than were expected, and prices have been affected accordingly. Against this, Congo anxieties have tended to support the price.

Lead has tended to be a rather firmer market, while zinc has maintained the improved tone of recent weeks.

Translation Service

From amongst the most recently published lists of translations available from the Iron & Steel Institute (4, Grosvenor Gardens, London, S.W.1), the following have been selected as being of interest to founders. The price quoted is that for single copies, postage extra, there being reductions for quantities ordered. Readers writing for translations, or for further information, should mention this JOURNAL when doing so.

BISI 1647 CLEANING STEELWORKS FUMES. Septier, L., and P. Leroy. Publ. IRSID, 1958, Series A, Dec. (194), pp. 1-47. (£9 10s.). After discussing the characteristics of fumes, the methods of collection, cooling and cleaning by wet- and dry-processes are described. Factors governing the choice of process are discussed. (29 refs.). Properties of steelworks fumes are tabulated in an appendix. (Abstract JISI, 1959, Oct., p. 186b).

BISI 1692 HIGH-TEMPERATURE PRECISION INVESTMENT CASTINGS. Schwalbe, R. *Stahl u. Eisen*, Jan. 7 pp. 36-45. (£6 10s.). After describing the lost-wax process the author examines the suitability of various materials for use at high temperature and classifies the temperatures up to 500, 600, 700, 850 deg. C. and more. Up to 700 deg. C., austenitic steels on the basis 18 per cent. Cr and 8 per cent. NI may be used, but for higher temperatures Co- or Ni-base alloys must be used. The main field of application of these alloys is turbines. (JISI Abstract).

BISI 1703 SPECTROCHEMICAL ANALYSIS OF SOLUTIONS BY SPARK EXCITATION. APPLICATION TO LOW-ALLOY STEEL, COPPER-ALLOYS, AND SLAG. Larsson, A. *Jernkont. Ann.*, 1959, (8), pp. 508-522. (£4 5s.). The method described involves partial evaporation of a drop of solution on the Cu or Ag electrode tip. Details are given of procedures for analysis of steel, Cu alloys and slags. (Author's summary).

Translations in course of preparation include:—

1851 INFLUENCE OF VACUUM CASTING ON SOME PROPERTIES OF STEELS (SHEET). Colombier, L., and C. Royer. *Rev. Mét.*, 1960, June, pp. 491-499.

1853 NON-DESTRUCTIVE QUALITY CONTROL OF CAST-IRON PARTS BY ULTRASONIC METHODS. Bierwirth, G. *Giesserei*, 1960, Feb. 25, pp. 94-98.

Rankin & Blackmore to diversify Activities

Rankin & Blackmore, Limited, marine engineers, Greenock, are at present concluding negotiations with Stork & Company, Hengelo, Holland for the assembly of Stork circulating pumps for land and marine use. Mr. T. W. D. Abell, a director of the Greenock firm, said that at the beginning his firm would import the parts from Holland, but if the demand was sufficient they would eventually manufacture the pumps. The move was part of a plan to diversify the firm's activities and to provide more jobs. Another development was the setting up of plant to manufacture ships' masts, which would be fabricated in steel and light alloys to any required size. Production of masts is expected to start at the end of this year.

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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

August 31, 1960

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone, £26 6d. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over; N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 7s. 6d.; Birmingham, £25 14s. 0d.; Wales (Welsh iron), £23 19s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-Silicon (6-ton lots and over).—45 per cent. Si, £42 10s. 0d. to £44 10s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £57 15s. 0d. to £61 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-Vanadium.—50/60 per cent., 20s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 12s. 1d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 15s. 1d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £80 10s. 0d. to £84 10s. 0d., basis 60 per cent. Cr. scale 27s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £79 0s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale, 27s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent. C,* 1s. 8½d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.10 per cent. C,* 1s. 9¾d. to 2s. 0¾d. per lb. Cr; 0.06 per cent. C,* 1s. 10¾d. to 2s. 1d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £275 0s. 0d.; 96/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £61 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—BASIC: soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

* Average 68-70 per cent.

FINISHED STEEL

Heavy Plates and Sections (1 ton to 10 tons).—Ship plate (N.-E. Coast), £41 12s. 0d.; boiler plates (N.-E. Coast), £44 2s. 0d.; floor plates (N.-E. Coast), £43 10s. 0d.; angles (N.-E. Coast), £38 16s. 6d.; joists (N.-E. Coast), £38 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £68 5s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £67 17s. 0d.; nickel-chrome, £98 11s. 0d.; nickel-chrome-molybdenum, £111 4s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £235 10s. 0d. to £235 15s. 0d.; three months, £236 0s. 0d. to £236 5s. 0d.; settlement, £235 15s. 0d.

Copper, Tubes, etc.—Solid-drawn tubes, 2s. 4⅛d. per lb.; rods, 258s. 0d. per cwt. basis; 20 s.w.g., 293s. 3d. per cwt.

Tin.—Cash, £799 0s. 0d. to £800 0s. 0d.; three months, £800 0s. 0d. to £801 0s. 0d.; settlement, £800 0s. 0d.

Lead (Refined Pig).—First half September, £71 7s. 6d. to £71 10s. 0d.; first half December, £71 10s. 0d. to £71 12s. 6d.

Zinc.—First half September, £86 0s. 0d. to £86 2s. 6d.; first half December, £86 2s. 6d. to £86 5s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £122 12s. 6d.; rolled zinc (boiler plates), all English destinations, £120 7s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £102 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 11¼d. per lb.; sheets to 10 w.g., 210s. 3d. per cwt.; wire, 2s. 9⅛d.; rolled metal, 210s. 3d. per cwt.

Brass (Brazing).—BS1400, B3, £172; B6, £222.

Brass (High Tensile).—BS1400, HTB1, £195; HTB2, £213; HTB3, £232.

Gunmetal.—BS1400, LG2, £216; LG3, £226; G1, 1% £285; G1, 1%, £274.

Phosphor Bronze.—BS1400, PB1 (AID released), £312; BS1400, 90/10/1, £300.

Leaded Phosphor Bronze.—BS1400, LPB1, £237.

Phosphor Bronze Strip, etc.—Strip, 300s. 6d. per cwt.; wire, 4s. 2d. per lb.; rods, 3s. 5d.; tubes, 3s. 5d.; chill cast bars, solids 3s. 4½d.; cored 3s. 4½d (CHARLES CLIFFORD, LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 11½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 4½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 3½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 2½d. to 2s. 3d. per lb.; Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £69 15s. 0d. to £70 0s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £250, AB2, £265.

Recent Wills

RAMSELL, H. G., general manager of Yale & Towne Manufacturing Company, and an authority on locks ... £25,936

GALL, C. W., formerly managing director of William Firth & Company, Limited, steel merchants, of Leeds ... £4,819

BELSEY, W. J., formerly manager of the marine department of the British Thomson-Houston Company, Limited ... £9,116

DOWNS, JAMES, former North of England area manager of Brown, Bayley Steels, Limited, Sheffield ... £1,703

HEYWOOD, S. W., of S. H. Heywood & Company, Limited, crane manufacturers, etc., of Reddish, Stockport (Ches) ... £61,315

JARMAN, J. H. W., former chief engineer (sales) of Tufnol, Limited, makers of electrical insulating materials, of Birmingham ... £8,705

STAVES, JOSEPH, former local director of Thos. W. Ward, Limited, engineers, ironfounders, metal merchants, etc., of Sheffield ... £6,762

BROOK, J. L., vice-chairman of Brook Motors, Limited, electric motor manufacturers, of Huddersfield, and Mayor of Huddersfield ... £136,601

CORDINGLEY, HERBERT, founder and managing director of the Roto Engineering Company (Bradford), Limited, who died in November, 1954 ... £1,588

LOVATT, SAMUEL, former director of Smith & Nephew Associated Companies, Limited, Smith & Nephew Engineering, Limited, and other companies ... £306,112

CRANE, W. F., chairman and managing director of Cranes (Dereham), Limited, makers of trailers, wheels, axles, etc., of Dereham (Norfolk) ... £65,134

DIXON, WILLIAM, a senior partner in Merz & McLellan, Newcastle-upon-Tyne consulting engineers, and a member of the firm since 1911 ... £246,854

SHENTON, C. J., chairman of James W. Shenton, Limited, ironfounders and general engineers, etc., of Tipton (Staffs) and son of the founder of the firm ... £43,099

ARNOTT, J. M., a director of the Albany Sheet Metal & Engineering Company (Oldham), Limited, and of the Stoneleigh Manufacturing Company (Oldham), Limited ... £70,003

PRESTON, ARTHUR, a director and former seretary of W. H. Davis & Sons (Wagons), Limited, makers of railway rolling stock, of Langwith Junction, Mansfield (Notts) ... £13,839

EVANS, J. O., former chairman and managing director of Joseph Evans & Sons (Wolverhampton), Limited, pumpmakers, etc., and great grandson of the founder of the firm ... £528,415

NEWTON, HARRY, partner, director, and until his retirement two years ago, chairman of Israel Newton & Sons, Limited, engineers and boiler makers, of Bradford ... £13,140

Board Changes

UNION STEEL CORPORATION (OF SOUTH AFRICA), LIMITED—Mr. D. O. Beckingham has been appointed a director in place of the late Mr. W. D. Wheeler.

METAL CLOSURES, LIMITED—Miss J. R. Sherriffs has resigned from the board and from those of the subsidiaries, Plastic Closures, Limited, and Johnson Bros. (Closures), Limited.

HARTLEY BAIRD, LIMITED—Mr. J. L. Symonds has resigned from the board following the disposal of its holding in Hartley Electromotives, Limited, to James Austin & Sons (Holdings), Limited.

NORTH BRITISH LOCOMOTIVE COMPANY, LIMITED—Mr. Alexander McKellar, president of the Chartered Accountants of Scotland, has been elected to the board in place of the late Mr. Hugh Cowan-Douglas.

TUBE INVESTMENTS, LIMITED—Mr. C. H. T. Williams and Mr. E. G. Plucknett have been appointed to the board. Mr. Williams is chairman of the Park Gate Iron & Steel Company, Limited, and Round Oak Steel Works, Limited, while Mr. Plucknett is managing director of the Simplex Electric Company, Limited.

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Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Monday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

YOUNG MAN, 30, well educated, City and Guilds Foundry practice and Diploma National Foundry College, executive, laboratory and sales experience, seeks interesting position in the foundry or allied industries in the London area. Prospects more important than starting salary. Box YM803, FOUNDRY TRADE JOURNAL.

METALLURGIST (44), A.I.M., with wide experience, seeks full or part-time position as Technical Representative to concern having foundry or other metallurgical interests in the Southern Counties. Box ME801, FOUNDRY TRADE JOURNAL.

EXPERIENCED FOUNDRY MANAGER, A.M.I.B.F., seeks change. Accustomed to full control of general iron foundry making castings up to two tons in weight. Box FF802, FOUNDRY TRADE JOURNAL.

PATTERNMAKER, 28. Practical experience in several foundries. Liaison experience, etc. Seeks liaison or representative position in foundry industry. Coventry, Birmingham. Box PT797, FOUNDRY TRADE JOURNAL.

NON-FERROUS METALLURGIST (39), M.I.B.F., seeks senior position. Fully experienced die, sand and shell moulding technique of aluminium alloys, also sound knowledge of copper base. Full control laboratory, radiography and melting methods. A.I.D. approved. Box NF792, FOUNDRY TRADE JOURNAL.

WORKS ENGINEER (40), A.M.I. Plant.E., A.M.I.B.F., requires new post. Good background and experience installation, maintenance and development modern mechanised foundries and machine shops. Salary range £1,500—£1,700. assistance with housing. Box WE763, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

A VACANCY exists for YOUNG TECHNICIAN in the Process Control and Development section of an Investment Foundry. Previous experience in this field of metallurgical engineering is not essential. Apply giving full details of education, previous experience, etc., to P. I. CASTINGS (ALTRINCHAM) LTD., Atlantic Street, Altrincham.

EXPERIENCED FURNACEMAN for melting non-ferrous metals, including nickel alloys. Permanent position for first class man in expanding business in Gloucestershire. Write full particulars to Box EX798, FOUNDRY TRADE JOURNAL.

METALLURGIST required for steel foundry technical control duties, together with development work in both the sand and metallurgical fields. Applicants should have experience in ferrous metallurgy and foundry experience would be an added advantage. This appointment carries an attractive salary and non-contributory pension benefits. Assistance with housing would be provided, if necessary. Apply in writing, giving details of qualifications and experience to THE CHIEF METALLURGIST, Catton & Co. Ltd., 29, Chadwick Street, Leeds, 10.

SITUATIONS VACANT —*contd.*

FOUNDRY FOREMAN. A clear-cut opportunity occurs for keen young man to progress to foundry management. Practical knowledge of grey iron work on heavy section machine tool castings essential. Theoretical knowledge and supervision experience distinct advantages. The foundry, which is located in West Yorkshire, produces an average 80 tons per month, maximum weight 25 tons, with supervisory staff of three. Applications should give full details of previous experience in chronological order, technical education and commencing salary required to Box FF783, FOUNDRY TRADE JOURNAL.

BRITANNIA IRON & STEEL WORKS LIMITED, BEDFORD

have the following vacancies:—

PATTERN-MAKERS, Wood and Metal.

Qualified FITTERS to be trained as Pattern-Makers.

Top rates of pay and full welfare facilities.

Applications in writing or in person to the PERSONNEL OFFICER.

NON-FERROUS FOUNDRY MANAGER wanted immediately 20 miles from London. Man with minimum five years' managerial experience in control of labour and production of Aluminium Sand and Gravity Die Castings, knowledge of Die and Pattern Lay-out estimating, cost control, ability to negotiate at Director level, able to work on own initiative with small progressive Company of good reputation. Good salary, expenses, housing assistance if required. Write Box NF769, FOUNDRY TRADE JOURNAL.

Training Course for Potential Supervisors

F. H. Lloyd & Company, Limited, steel-founders and engineers, with associate companies in Burton and Derby, invite applications from men to join a Trainee Supervisors Course organized by the company with the object of becoming supervisors in the F. H. Lloyd organization, particularly in the foundry and dressing departments. Further promotion will depend on individual progress. Qualifications: Age 25 to 35; technical qualifications and practical foundry experience are desirable but not essential; selected men will be those with proven qualities of initiative, responsibility and leadership who are keen to get on through hard practical work and study.

The Course will be comprehensive and of 18 months' duration. Selected candidates who have no suitable technical qualifications will be expected to pursue a course of studies in their own time to fit them for the future. Salary during training £600 per annum. Applications should be sent to:

LABOUR MANAGER, F. H. LLOYD & COMPANY, LIMITED, P. O. BOX 5, WEDNESBURY, STAFFS., not later than September 12. All applications will be dealt with in the strictest confidence.

SITUATIONS VACANT —*contd.*

METALLURGIST required for Foundry in the Midlands, able to help in the development of Steel Base Rolls. Box MR777, FOUNDRY TRADE JOURNAL.

ASSISTANT FOREMAN required for highly mechanised and expanding Coreshop in Midlands. Excellent working conditions. Canteen facilities. Superannuation. Box AF800, FOUNDRY TRADE JOURNAL.

FOUNDRY METALLURGIST required for modern mechanised Non-ferrous Foundry. Responsible to Foundry Manager for full process control, that is, analytical Laboratory, Sand Melting and Temperature control. Experience in H.F. Stainless Steel melting and Shell process an advantage. Applications to FOUNDRY MANAGER Dewrance & Co., Limited, Hillington Glasgow, S.W.2.

FOUNDRY FOREMAN

THE COMPANY has a vacancy for an experienced Foundry Foreman in the Heavy Foundry of the Engineering Division. Applicants must have had a good general foundry training and be experienced in producing high quality iron castings in green or dry sand.

The position is permanent, pensionable and carries an attractive starting salary. Assistance with housing is available if required.

Please reply giving full details of age, experience and present position to:—

THE STAFF OFFICER
Newton Chambers & Co., Ltd.
Thorncliffe, Near Sheffield.

STEEL FOUNDRY SUPERINTENDENT AUSTRALIA

WANTED.—An experienced Superintendent for an electric steel foundry organisation employing around 250 operators. The person required must be a Journeyman Steel Moulder with C & G qualifications plus 10 years' post apprenticeship experience in Jobbing and Machine Moulding producing castings up to 10 tons weight. Applications giving fullest personal details, trade experience and salary expected. Box WA775, FOUNDRY TRADE JOURNAL.

FOUNDRY METALLURGIST

Midland Malleable Iron Foundry requires experienced Metallurgist for technical and administrative control of Cupolas, Annealing and small Laboratory. Applicants must be capable of controlling labour. Preferred age group 35 to 45. A Senior Staff position and Salary offered will be in accordance with qualifications and experience.

Apply:—Box MM 790,
FOUNDRY TRADE JOURNAL

SITUATIONS VACANT—*contd.*

STEWARTS AND LLOYDS, LIMITED require a

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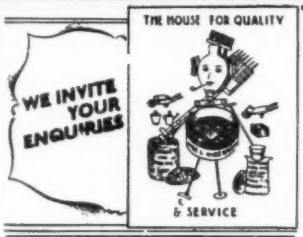

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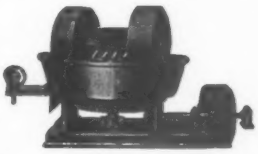

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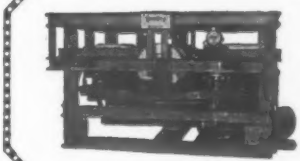

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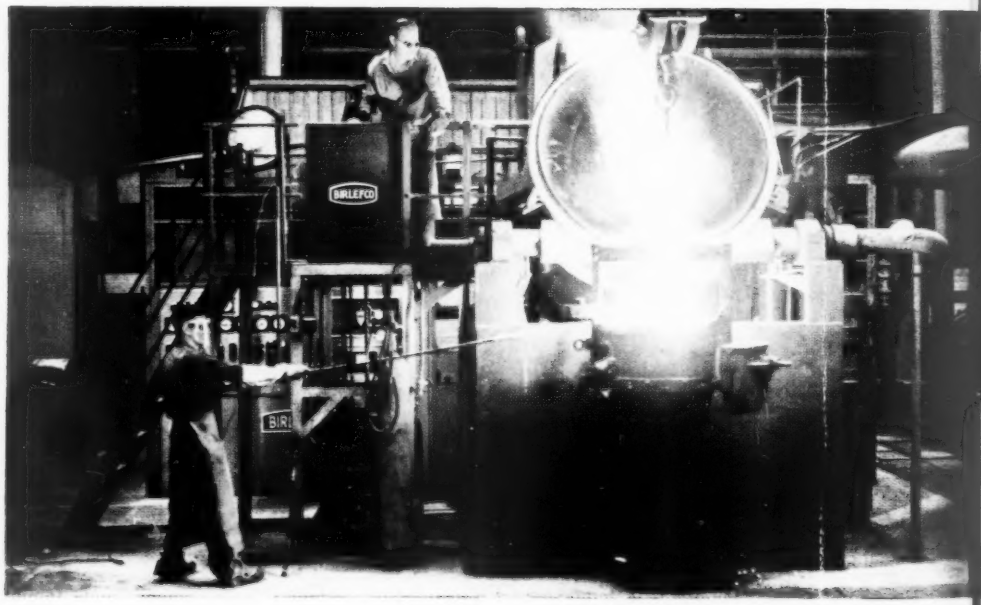

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